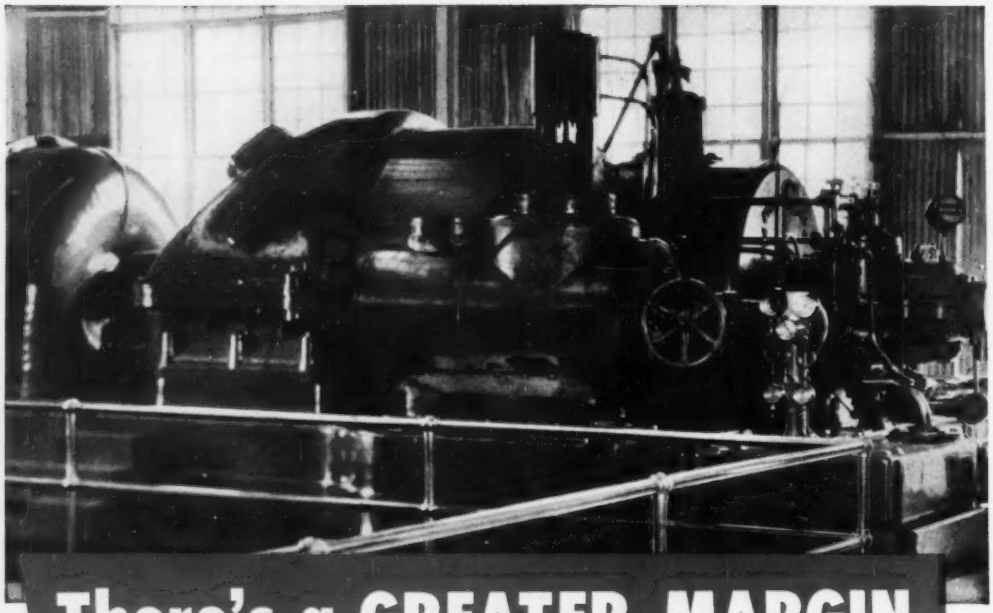
SEPTEMBER 10, 1951

Electrical World

Price 35 Cents

A McGRAW-HILL PUBLICATION



There's a GREATER MARGIN OF SAFETY in TEXACO REGAL OIL (R&O)

Lubricate turbines with *Texaco Regal Oil (R&O)* and forget about rust, sludge and foam. *Texaco Regal Oil (R&O)* keeps the entire system clean, assures normal bearing temperatures, instantly responsive governor action. Your margin of safety is appreciably greater.

For close to a quarter-century, starting long before rust- and oxidation-inhibitors came into use, Texaco Regal Oil has been a world-famous turbine oil. In recent years it has been *made even better,* improved with special Texaco additives and processing. Now available as *Texaco Regal Oil (R&O),* it has *more than ten times as much oxidation-resistance* and far surpasses other oils in preventing rust and foam.

There is a complete line of *Texaco Regal Oils (R&O).* They meet the stringent standards of leading turbine builders and are the choice of turbine operators everywhere.

A Texaco Lubrication Engineer will gladly show you what this extra margin of safety means in terms of dependable, economical turbine performance. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO REG'T.M.

TEXACO Regal Oils (R&O)

FOR ALL TURBINES

SOMETHING LIKE GOLD MINING

"Technical Notes" is ahead of any other department in Electrical World when it comes to stimulating letters to the editor. These terse, cogent notes on the techniques of progress are also a popular subject of conversation. One of the most frequently asked questions the editors hear in the field is "Where on earth do you find that stuff?"

There's no simple answer. Almost every one of these brief items is distilled from a prodigious number of words, either written or in conversations with engineers, or both.

Chief distiller is Senior Associate Editor Arch Knowlton, a rapid and insatiable reader of industry papers, committee reports, and technical writings of every kind. He appears to read almost a paragraph at a glance, and once gobbled up "Anthony Adverse" on a Sunday afternoon. He's also a tireless talker to engineers.

The essence of all of that is in "Technical Notes." Arch Knowlton says it's a little bit like gold mining; you move an awful lot of stuff to get what you're after.

MOTION PICTURES

Industries throughout America are finding in the motion picture film an exceptionally good medium for presenting the educational side of their products or their services.

Electrical World had decided to list those that are of special interest to the electric power industry.

That is why we've started our latest column, called "Motion Pictures." It will not appear at regular intervals, but we will conscientiously keep tab on the better films available, and make note of them from time to time, together with the facts on how and where you can borrow and show them.

TELEVISION INTERFERENCE

Back on January 16, 1950, Electrical World published an article called "Television Interference Seldom Comes From Power Systems." Among other things the article showed pictures of how the different kinds of interference look on your screen, and what they're caused by. That article was so fundamental that it's still in wide demand by readers and power companies. Up to August 21, we had sold nearly 18,000 reprints, and orders are still coming in.

Electrical World

Published for 77 years for those engaged in the business of generating, transmitting, distributing or applying electric power

Vol. 136 No. 11 **CONTENTS** **September 10, 1951**

Editorials 101

News

The Electrical Week	103	Technical Notes	114
Industry Mobilization	104	News About People	217
Financial News	112	Manufacturers & Markets	228
Washington Comment	114	New Electrical Construction	232

Features

★ ELECTRICAL INDUSTRY FORECAST FOR '52 115
The Power Expansion Program Grows Daily 118
Utility Wage Rates to Climb Further 119
Utility Earnings Turn Down 120
Numerous Electric Rate Increases 122
Copper Requirements for Power Systems ... H. E. Campbell and W. L. Kelly 123
Distribution Capacity Added Quickly ..... R. F. McClure 126
Specifying Automatic Bus Transfers ..... Amado Conangla 130
Lamp Making Contest Makes New Friends ..... V. E. Shepherd 132

Departments

How To	136	Technical Literature	236
Engineering Reference Sheet	140	Book Reviews	238
Industrial Applications	158	Motion Pictures	240
Sales and Service	160	Catalogs and Bulletins	242
New Equipment	170	Index of Advertisers	243
What They're Saying	192	Letters	248

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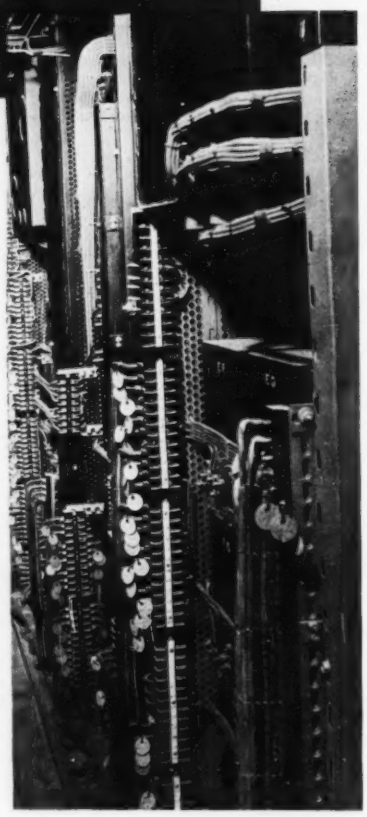
FOR "ROUND-THE-CLOCK" CIRCUIT SECURITY—

Multi-conductor control cables have color-coded Okoprene over each conductor with an Okoprene sheath over-all.

Okolite-Okoprene cables can be furnished with interlocked bronze armor where troughs or trays are used.

For wet underground runs, lead-sheathed Okolite-Okoprene cables provide extra security (note rubber fillers).

OKOLITE-OKOPRENE CONTROL CABLES



Control cable must be the most versatile of all types of cable. In its wide variety of uses, control cable may be called upon to operate under almost any kind of service condition.

Horizontal or vertical, indoors or out, above or underground, in wet, dry, hot or cold locations, exposed to oils, acids, chemicals, sunlight or any kind of weather—control cables must keep key circuits operating *around the clock*.

Okolite-Okoprene is one type of cable construction that fulfills every requirement for control cable. The principal reason for its usefulness as control cable is the unique combination of Okolite Insulation and Okoprene Sheath. These two combine the highest dielectric strength with the most impervious protective covering... resulting in an unequalled soundness both electrically and physically.

Yet there are many other features which contribute to Okolite-Okoprene's outstanding performance as control cable. *Bulletin EW-1056* gives full details and specifications, with a description of Okonite's famous strip insulating process, special Okoloy conductor coating, a-c and d-c super-voltage testing, and many more.

If your expanding electrical plans call for additional control circuits, make sure you use the one cable qualified to give you "round-the-clock" security: Okolite-Okoprene. Inquire today from The Okonite Company, Passaic, N. J.

THE BEST CABLE IS YOUR BEST POLICY

OKONITE SINCE 1878 *insulated wires and cables*

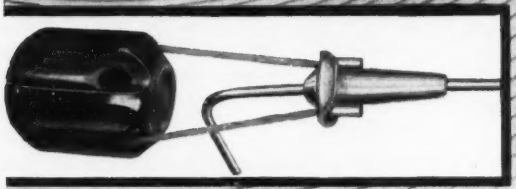
9436

Electroline

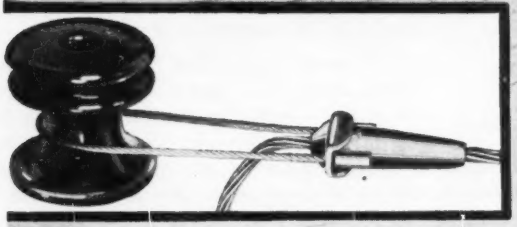
AUTOMATIC DEAD-ENDS

"AS GOOD AS NEW" AFTER TORTURE TEST

Electroline AUTOMATIC DEAD-ENDS are continually subjected to gruelling tests for strength, gripping and vibration damping features. In a typical test, 100,125,000 recorded vibrations did not develop any sign of failure of conductor in these dependable Dead-Ends. Month after month, day and night, these Dead-Ends held their positive grip and retained the full strength of the conductors. Engineers compute that the Dead-Ends withstood the equivalent of 50 years of ordinary service and state that they were as good as new at the end of the test.



3400-SERIES



The 3400-SERIES consists of an Electroline Automatic Connector, a yoke and flexible bail. These three are permanently interlocked once the conductor is inserted to form a complete unit that fits either strain or spool-type insulators.

This series permits the feeding of the conductor through the connector, eliminating the use of taps in the line span. The damping features incorporated in Electroline Dead-Ends prolong the life of conductors by preventing crystallization at the point of connection. They insure full line strength and save on construction costs by their quick and easy installation. These economical Dead-Ends can be reclaimed and used again. But, once installed, the conductor is there to stay; it cannot become detached until released by a lineman.

FOR COMPLETE DETAILS WRITE FOR BULLETIN.

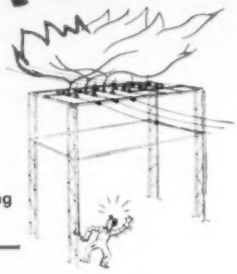
TALENT TO ORIGINATE E ABILITY TO PRODUCE

Electroline Company

4121 South La Salle Street • Chicago 9, Illinois

In Canada: **POWERLITE DEVICES, LTD., TORONTO**

Alduti INTERRUPTER SWITCHES



① Where Horn Gap Switches Are Inadequate

because horn gaps cannot, under all conditions, safely break magnetizing or charging currents; nor can they interrupt load currents

② Where Circuit Breakers Are Too Expensive

for non-automatic switching and short circuit protection

ALDUTI INTERRUPTER SWITCHES

offer a proved and economical solution to such application problems.

Ten years of operating experience in thousands of installations, and many field trials under severe test conditions, have demonstrated the ability of these Interrupter Switches to — safely and repeatedly —

- Sectionalize either radial or loop distribution and subtransmission circuits, under either load or charging current conditions . . .
- Switch load and magnetizing currents of transformer banks . . .
- Switch charging currents of capacitor banks.

And because there is NO EXTERNAL ARCING during the operation of Alduti Interrupter Switches: they need not be mounted horizontally upright, but can be mounted vertically, or underhung; hook stick operation can be employed where economy dictates; and phase spacings can be reduced to 18 inches for the 7,500-volt and 33 inches for the 34,500-volt switches. Hence structures can be smaller, connections simpler, and construction cost can be reduced below that of installing horn gap switches.

Also, Alduti Interrupter Switches can be metal-clad, thus providing—even for subtransmission applications — enclosed "packaged-type" switches, thereby permitting the complete enclosure of all components of a substation.

When combined with S&C Power Fuses, Alduti Fused Interrupters also provide short circuit protection with fault current interrupting ability up to 40,000 amperes asymmetrical, thus making possible the elimination of expensive circuit breakers where automatic switching is not required.

Alduti Interrupter Switches are supplied in these ratings:

Volts	Continuous Amperes	Interrupting Amperes, Nominal
For hook stick or group operation		
7500 & 15000	400, 600, 1200	400, 600
For group operation only		
23000 & 34500	600	600

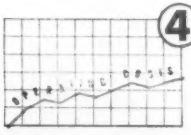
S&C ELECTRIC COMPANY

Formerly SCHWEITZER & CONRAD, INC. In Canada, Powerlite Devices, Limited, Toronto

give you Great Advantages:

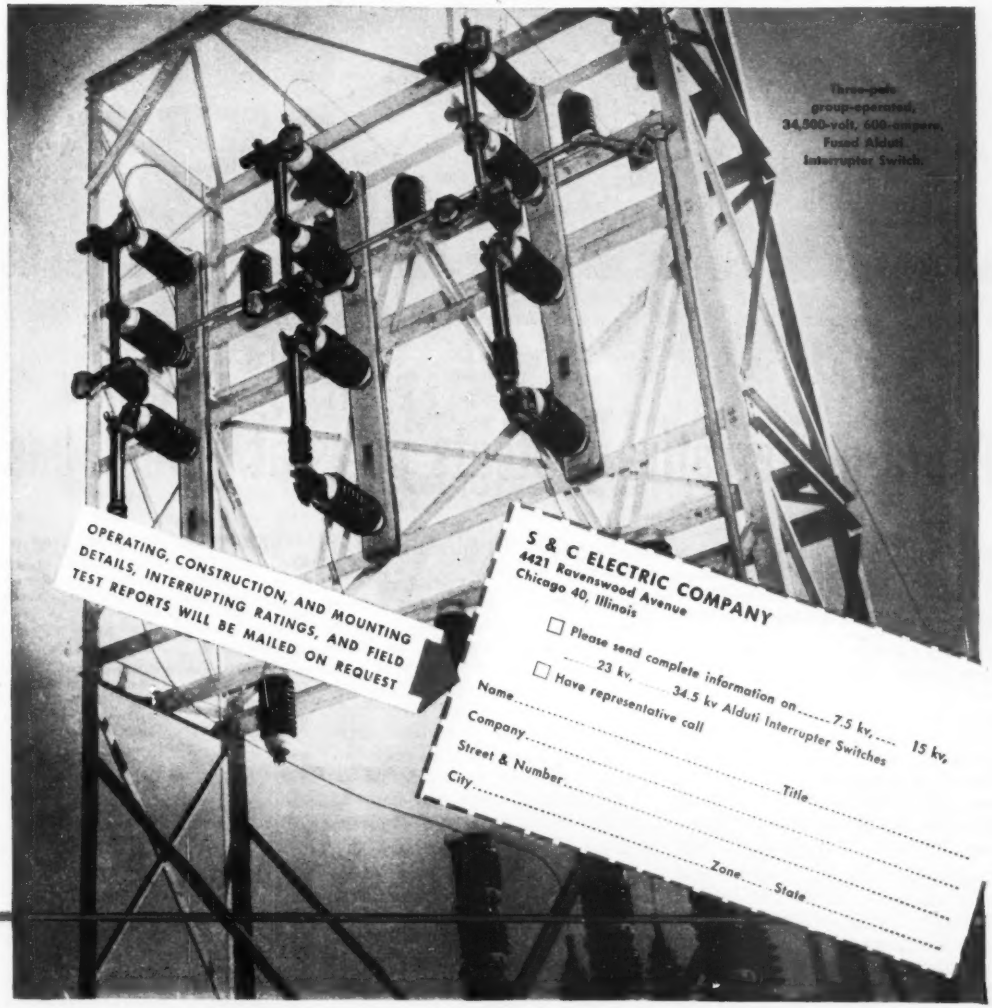
③ Where Structure Design Is Restricted

because horn gap switches can be mounted only in the horizontal upright position, and need wide phase spacings



④ Where Switching Sequences Are Complicated And Costly

because multiple operations—involving breakers, disconnects, and operating personnel— are required to isolate equipment or sectionalize circuits



Three-pole group-operated, 34,500-volt, 600-ampere, Fused Alduti Interrupter Switch.

OPERATING, CONSTRUCTION, AND MOUNTING DETAILS, INTERRUPTING RATINGS, AND FIELD TEST REPORTS WILL BE MAILED ON REQUEST

S & C ELECTRIC COMPANY
4421 Ravenswood Avenue
Chicago 40, Illinois

☐ Please send complete information on ..... 7.5 kv, ... 15 kv, ... 23 kv, ... 34.5 kv Alduti Interrupter Switches

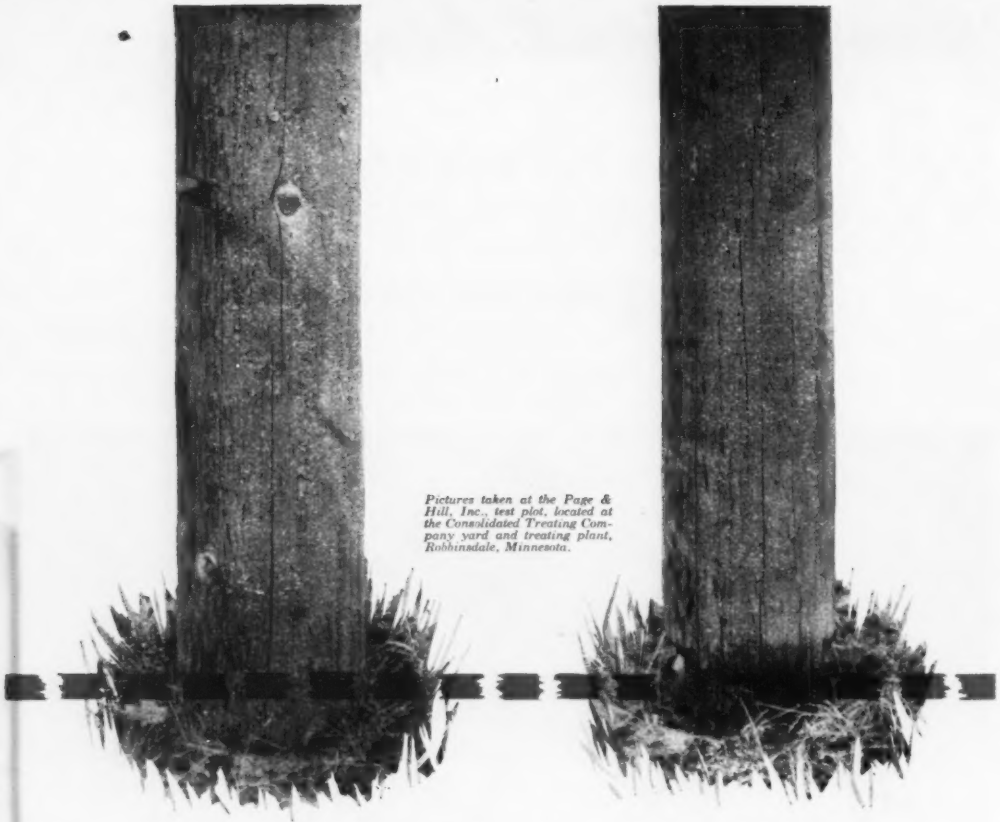
☐ Have representative call

Name ..... Title .....

Company .....

Street & Number .....

City ..... Zone ..... State .....



Pictures taken at the Page & Hill, Inc., test plot, located at the Consolidated Treating Company yard and treating plant, Robbinsdale, Minnesota.

Penta preservative protects poles at ground line

Even at the ground line, where utility poles are most severely attacked by decay organisms, Monsanto Penta preservative gives lasting protection.

Proof of this statement is seen in the unretouched photographs above. The untreated pole, at the right, shows damaging effects of decay. The treated pole, at the left, shows no decay . . . even at the ground line! These poles have been standing for ten years in the test yard of Page & Hill, Inc., at the Consolidated Treating Company, Robbinsdale, Minn.

The treated pole was given hot and cold immersion in 5% solution of Monsanto Penta for sufficient time for the timber to retain a half pound of dry penta per cubic foot of sapwood at the ground line and below. The portion above the ground was treated to retain a quarter pound of penta per cubic foot.

Properly formulated penta is a *clean* treatment. It protects poles and crossarms from decay due to fungi and from attack by termites and other wood-boring insects. Penta, a chemical with stability, gives uniform, long-lasting protection. It is insoluble in water and does not leach. Penta treatment does not change dimensions of wood nor corrode common metals.

For detailed information on applying Monsanto Penta to poles, crossarms or other wooden structures, contact the nearest Monsanto Sales Office or write MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1700 South Second Street, St. Louis 4, Missouri.

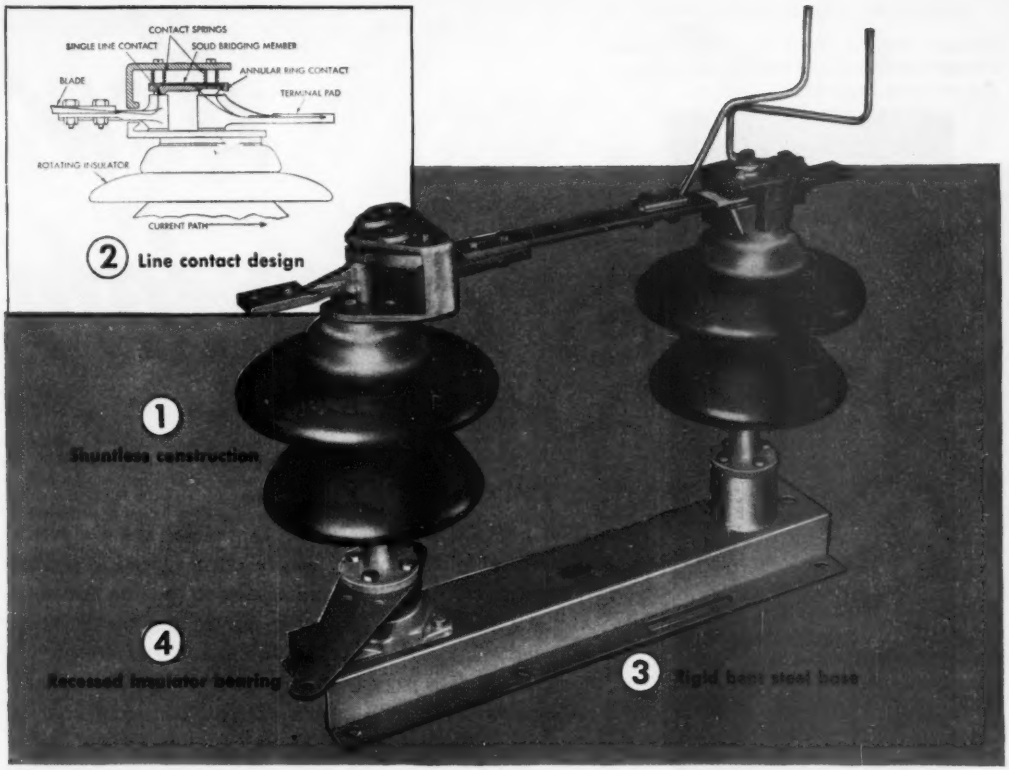
WHERE TO USE PENTA PRESERVATIVE

Poles and crossarms • Planks covering underground cables Transformer platforms • Sills and plates • Joists and girders • Screeds and subflooring • Flooring • Roof planks • Platforms and decking • Posts and fences Cooling towers • Millwork • Guardrails • Truck beds Construction timbers.

DISTRICT SALES OFFICES: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

MONSANTO
CHEMICALS – PLASTICS

SERVING INDUSTRY...WHICH SERVES MANKIND



Now...SHUNTLESS CONSTRUCTION

in the improved RL design!

1. Shuntless construction pioneered in the Westinghouse Type-V Switch—has now been extended to the RL design for those applications where a two insulator side-break switch is preferred. For you this means longer switch life for there's nothing to corrode or break... nothing to require periodic replacement.

2. Line contact design assures low-resistance path from the blade to the bridging member through a single contact... then to the terminal pad through an annular ring contact.

3. Bent plate steel base provides important rigidity for maintaining alignment... greater mounting surface... shorter mounting bolts.

4. Recessed insulator bearing permits a flat bearing surface for faster, easier installation or storage. There's nothing to get in the way.

For complete information on all Westinghouse Disconnecting Switches, ask for Booklet B-4726. Call your Westinghouse Office or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-60750

YOU CAN BE SURE... IF IT'S Westinghouse

DISCONNECTING SWITCHES

NEW UTILITY STATIONS C-E EQUIPPED

Includes stations placed in operation since the war (in white) and those under construction or being engineered.

New goes into

The new Edge Moor Power Station of the Delaware Power & Light Company was recently placed in service when two 60/66,000 kw units went on the line. An additional 60/75,000 kw turbine-generator unit has also been ordered and scheduled for service late in 1954.

Located at Edge Moor, on the Delaware River, near Wilmington, this fine modern plant will be used primarily to serve Wilmington and the surrounding area of Delaware. In addition, it will also help serve the growing needs of business, industry and homes in the thriving Delmarva Peninsula. Edge Moor Station was engineered and constructed by United Engineers and Constructors, Inc., Philadelphia.

Steam for the first section of this new station is supplied by two C-E Steam Generating Units designed to produce continuously 600,000 lb of steam per hr at 1350 psi and 950 F. A third C-E Unit, which will be of the reheat type, is now on order. A cross-sectional elevation of one of the initial C-E Units, together with a brief description thereof, appears on the opposite page. B-510

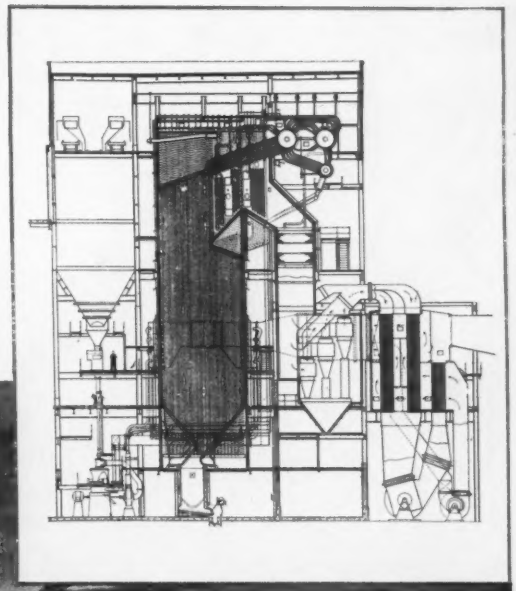
C-E

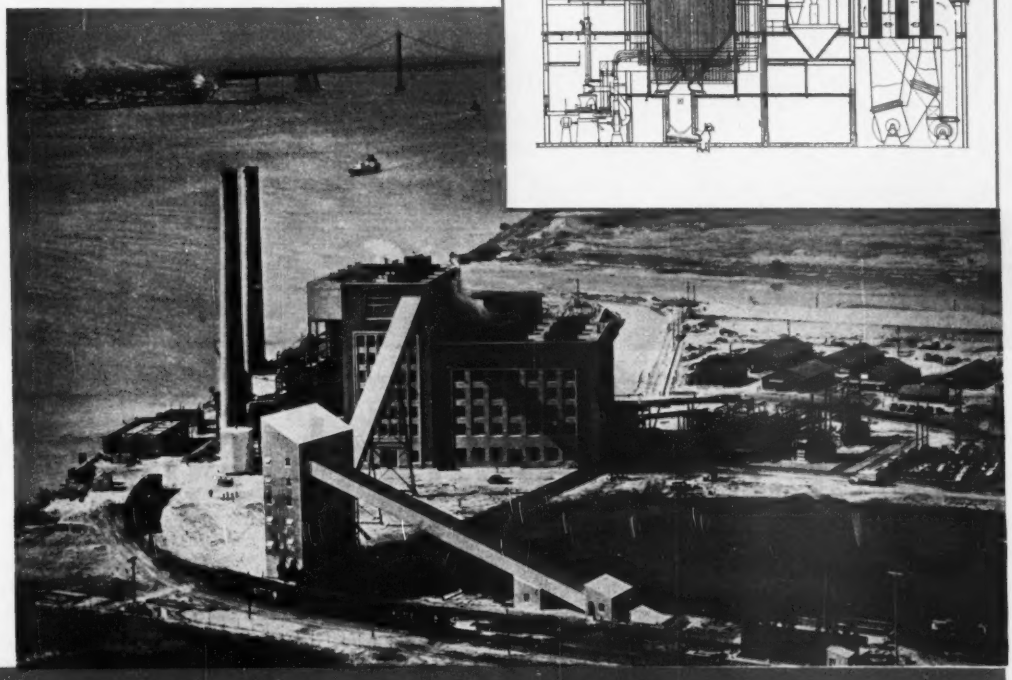
COMBUSTION

200 MADISON AVENUE, NEW YORK 16, N. Y.

Edge Moor Station service

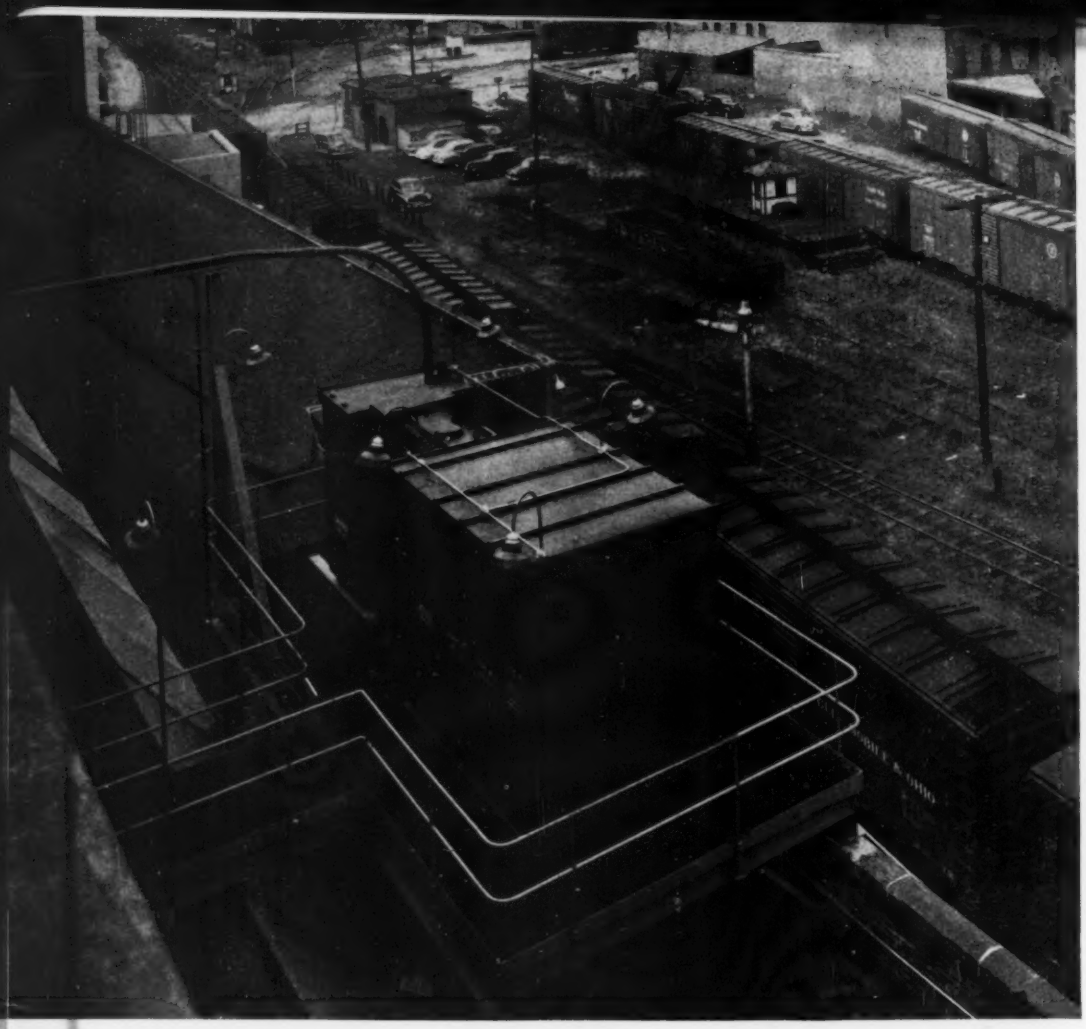
The cross-section at the right shows one of two duplicate C-E Units which comprise the first section of the Edge Moor Station. It is a 3-drum boiler with 3-stage superheater and integral finned-tube economizer in the rear pass. A C-E Tubular Air Heater follows the economizer surface. The water-cooled furnace is of the basket bottom type. The unit is pulverized coal fired, using bowl mills and vertically-adjustable, tangential burners. Provision is also made for the future use of fuel oil if desired.





ENGINEERING—SUPERHEATER, INC.

ALL TYPES OF BOILERS, FURNACES, PULVERIZED FUEL SYSTEMS AND STOKERS; ALSO SUPERHEATERS, ECONOMIZERS AND AIR HEATERS



Original 1500-kva single-ended G-E load-center substation installed on plant roof to conserve valuable floor space.

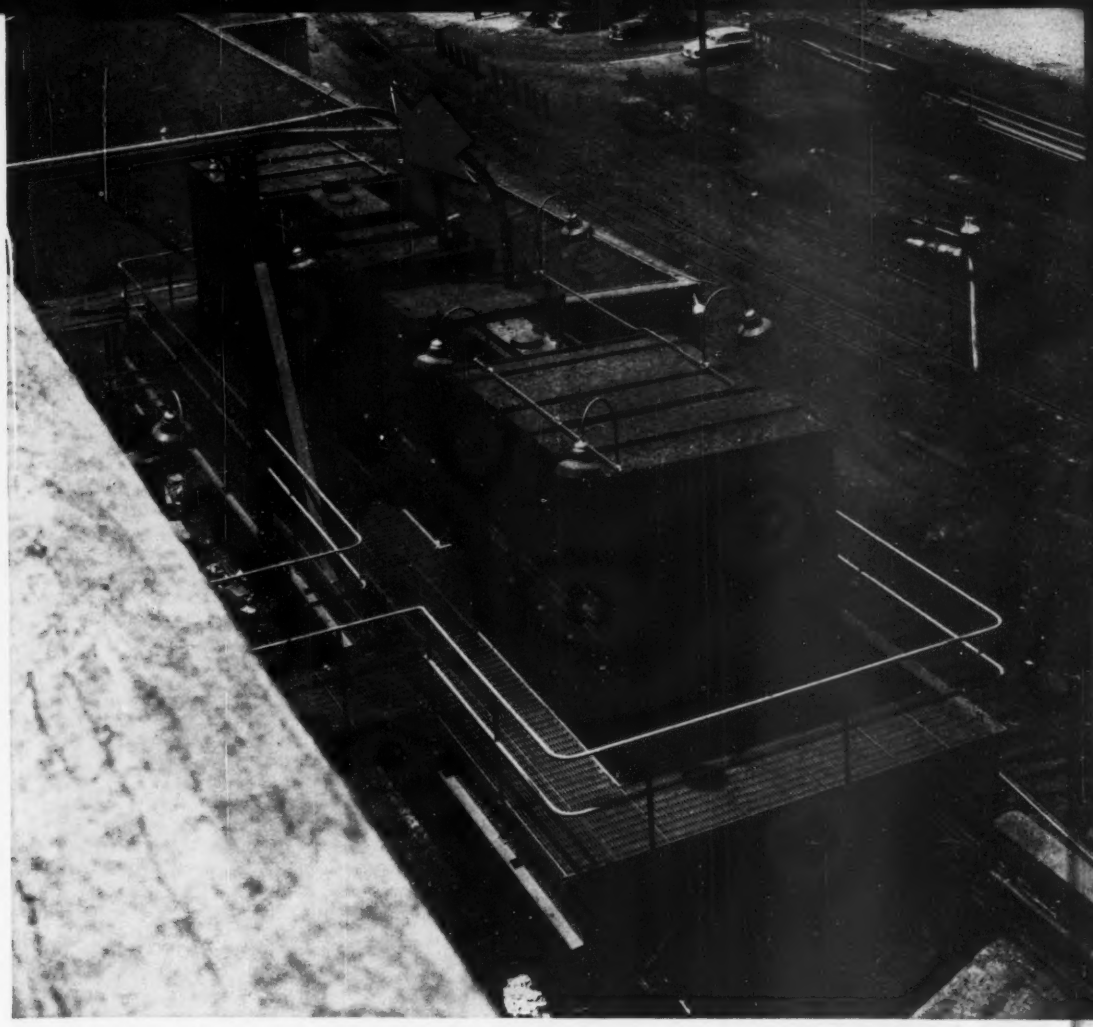
Foresight that paid off

POWER DISTRIBUTION SYSTEMS

Some time ago, an Eastern industrial put in a G-E load-center distribution system, knowing that the load served by one of its substations (above left) would probably double within five years. It actually doubled after *one* year.

With any other type distribution, the company would have eventually needed a bigger transformer, taxing the interrupting capacity of existing circuit breakers. Or had the original unit been twice needed size, investment would have been half-wasted for one year. Instead, the company waited until load doubled, then added another "building block" of power of the same economical size, keeping cost-per-kva at optimum. This load area is now fed by two 13,200-volt feeders, one to each transformer, for greater reliability.

What's more, the new substation was installed,



Recent addition of second 1500-kva substation, installed beside original one. Load area is now reached by two high-voltage feeders.

when power needs doubled

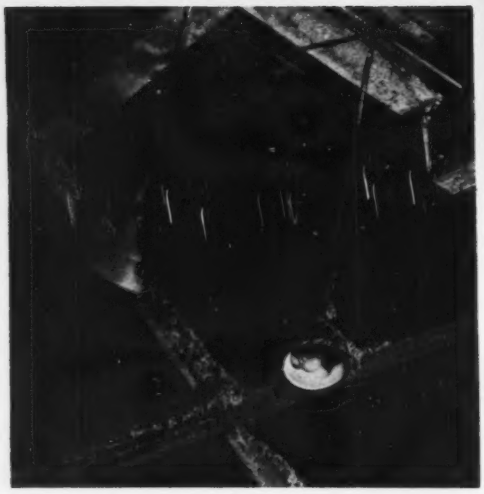
connected and energized without disrupting existing service. *Nothing already done was undone.* Your nearest G-E sales office can help you find the best way to distribute power in *your* plant during these years of expansion. *General Electric Company, Schenectady 5, N. Y.*

854-40

GENERAL ELECTRIC

When it's *too hot*

AMERICAN STEEL & WIRE COMPANY
USS
AMERICAN ELECTRICAL WIRE AND CABLE
UNITED STATES STEEL



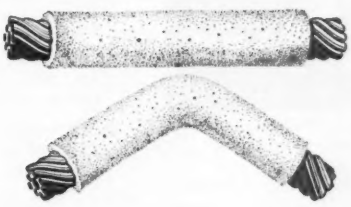
IT'S HOT IN HERE! Electric furnace cable must carry huge currents close to the destructive heat of the furnace itself. Amerbestos is a natural for this installation because 1) it can withstand the heat, and 2) the special felted asbestos construction can be continually flexed.

THESE LIGHTS, WIRED WITH AMERBESTOS, are installed under a blast furnace that often operates several months at a time without stop. Notice how the boiling slag (at 3,000°F.) has piled up on the lights. Despite the heat, this Amerbestos has never shown the slightest trace of trouble.

for everything else — use AMERBESTOS

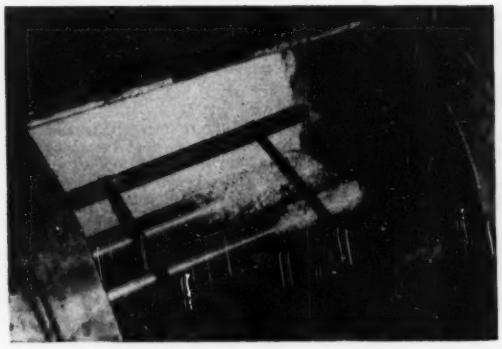
special felting process

assures more effective insulation



● Heat-Resistant Amerbestos Wire and Cable has a very special feature that you should know about. It's all in the way we apply the asbestos insulation.

Conventional heat-resistant wire and cable uses asbestos that is spun into a yarn then wrapped around the conductor. This has some serious disadvantages that you can quickly spot if you look at the drawing. When the conductor with this type of insulation is bent, the asbestos yarn is unevenly stressed. Therefore it separates at the outer radius of the bend, and all the effect of the asbestos insulation is lost at that point.



Compare this to Amerbestos. We don't use spun asbestos yarn. Instead, we actually "felt" the asbestos and apply it evenly around the conductor. As you can see from the actual production photograph, the fibres are "picked" off a rotating drum with a vibrating steel comb. Then the conductor and asbestos are slowly pulled through a closing die that compresses the fibres into a tightly packed felt that *stays put* even when bent.

This careful attention to sound construction methods has been largely responsible for the ever-growing demand for Amerbestos Wire & Cable. Plus the fact that Amerbestos is made in a *complete* range of sizes, both plain asbestos and AVC, with a wide variety of special jackets to fit every heat-resistant wire or cable requirement.

For more information, write American Steel & Wire Company, Rockefeller Building, Cleveland 13, Ohio.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO • COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

American Electrical Wire and Cable

UNITED STATES STEEL

BIDDLE *Instrument News*

- ELECTRICAL TESTING INSTRUMENTS
- SPEED MEASURING INSTRUMENTS
- LABORATORY & SCIENTIFIC EQUIPMENT

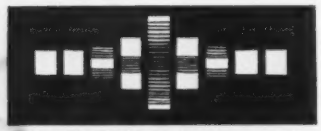
NUMBER 1 OF A SERIES

JAMES G. BIDDLE CO., 1316 ARCH ST., PHILADELPHIA 7, PA.

FREQUENCY MEASUREMENTS MADE EASY with FRAHM® RESONANT REED FREQUENCY METERS

Indicate Alternating Current Frequency from 15 up to 1500 Cycles per Second

Applicable to Pulsating or Interrupted D-C as well as to A-C Supply Circuits



EASY TO READ—Vibrating reed tips form a clearly defined pattern

Here are other advantages of Frahm Resonant Reed Frequency Meters gained by the simplicity and unfailing accuracy inherent in these instruments.

- **DEPENDABLE**—permanent calibration is a natural characteristic of tuned reeds.
- **STURDY**—there are no delicate pivots, jewels or moving parts.
- **LITTLE MAINTENANCE**—the result of simple, sturdy construction.
- **NO WAVE-FORM ERRORS**—resonance is a function of the driving frequency only.
- **INPUT VOLTAGE IS NOT CRITICAL**—accuracy is independent of supply voltage.
- **UNAFFECTED BY EXTERNAL FIELDS**—damping effect on natural reed frequencies is negligible.
- **INDEPENDENT OF LOAD, POWER FACTOR or PHASE SHIFTS** in supply circuit.

FRAHM Frequency Meters are available in switchboard, miniature and portable types. We invite correspondence regarding applications which require special modifications of range, method of actuating, scale graduations or other design characteristics. - We'll send you a bulletin that contains a wealth of information on this subject. Write today for Bulletin 32-W.

(Model 1B—Battery Operated Set)

FOR LOW-RESISTANCE MEASUREMENTS BETWEEN 100 AND 10,000 MICROHMS

Megger® Low Resistance Ohmmeters in Portable Types for Field and Shop Use

Self contained battery-operated and rectifier-operated types of Megger Low Resistance Ohmmeters have just been developed. They are designed for hard routine and emergency service in measuring contact resistance, such as in circuit breakers, relays, switches, bonds, connections and joints, commutator bar-to-bar tests and the like.

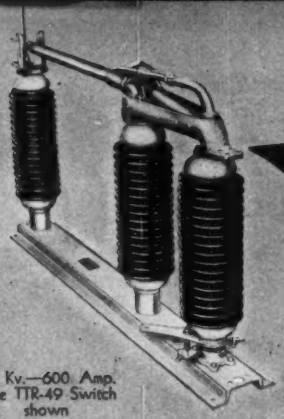
These portable instruments (weight 19 lbs.), are designed for low resistance measurements in the shop and in the field. They are of moderate cost and are accurate to within 1.5% of full scale deflection.

Model 1B operates from two 4 FH dry cells mounted inside the case.

Model 1R operates from a rectifier, built inside the instrument case, for connecting to 115 volts, 50-60 cycles.

Both models have a range of from .001 to .010 ohms. These new instruments operate on the same crossed-coil ohmmeter principle as the Ducter Low-Resistance Ohmmeter, with pointer indications of resistance and no necessity for balancing or voltage adjustment. Scales have fairly uniform graduations and are approximately 3¼" long. Anyone can operate this equipment—no special training or experience is required.

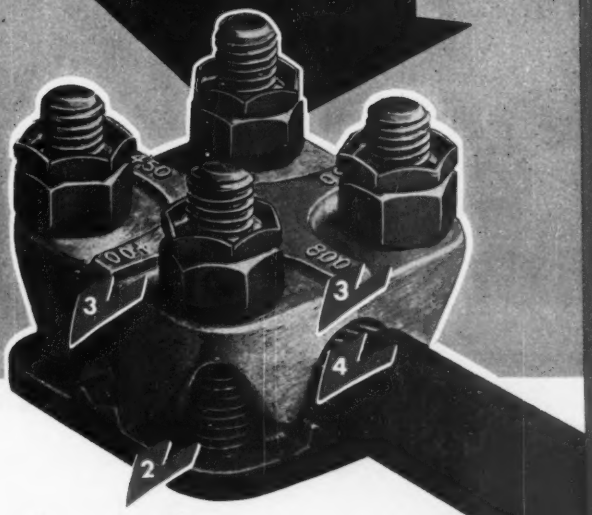
For particulars and prices write for Bulletin 24-46-W.



69 Kv.—600 Amp. type TTR-49 Switch shown

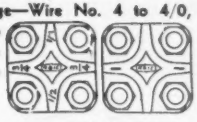
R&IE UNIVERSAL TERMINAL CLAMPS

A feature found on all R&IE switches



Check the facts...

1. They combine many odd sizes of clamps for wire, cable and tubing—eliminate specifying diameters except for special conductor requirements.
2. Mounts on terminal pad with four half inch bolts on 1¾" centers.
3. Choice of clamp position doubles conductor range for each clamp. Note a 90° change in position can be made for quick selection of either of two indicated range sizes.
4. Overlapping sides of clamping cradle hold cable strands together.
5. Only three clamps cover full conductor range—Wire No. 4 to 4/0, Cable No. 4 to 800 MCM, Tubing ⅜ inch to ¾ inch.



6. Two clamps for specified conductor sizes—Cable 350 MCM to 1250 MCM, Tubing—½ inch and ¾ inch, and 1 inch.

RAILWAY and INDUSTRIAL ENGINEERING CO., Greensburg, Pa.

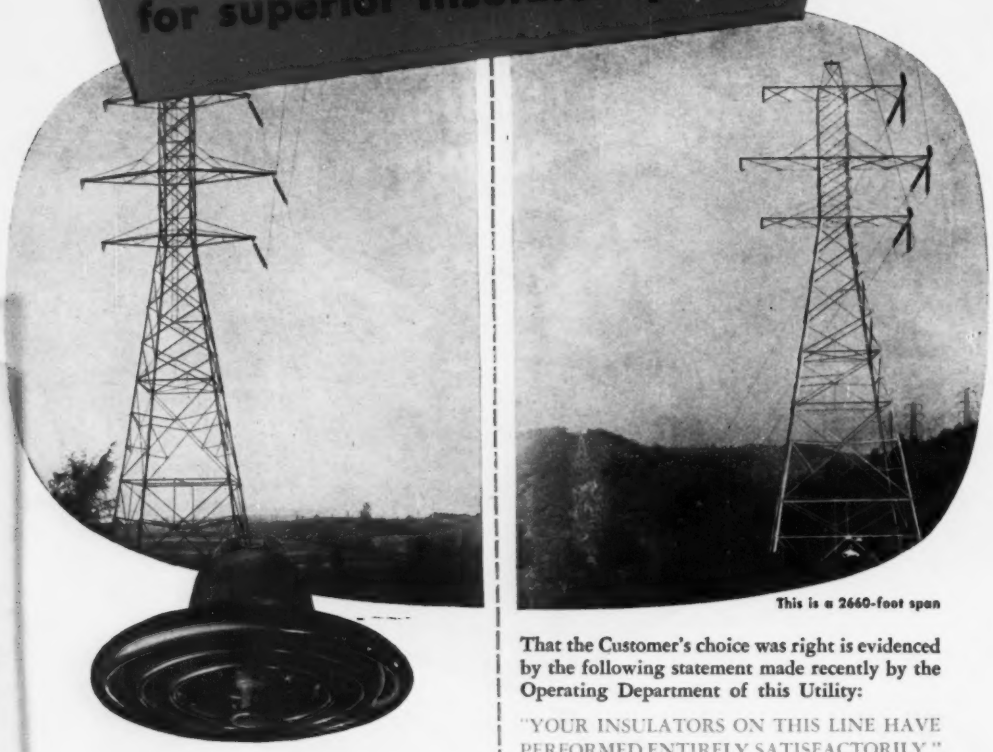
IN CANADA—EASTERN POWER DEVICES LIMITED, TORONTO

AN I-T-E SUBSIDIARY

The Check List

- DISCONNECTING SWITCHES INDOOR AND OUTDOOR
- CONDUCTOR SUPPORT CLAMPS AND FITTINGS
- HORN GAP SWITCHES
- INTERRUPTER SWITCHES
- CUTOUTS AND THERMO-RUPTERS
- DISTRIBUTION EQUIPMENT
- SWITCH OPERATING MECHANISMS
- SUBSTATIONS
- OPEN OR ENCLOSED ISOLATED PHASE HEAVY DUTY BUS
- KIRK INTERLOCK SYSTEMS
- AUTOMATIC SWITCHING EQUIPMENT
- METAL CUBICLES
- TESTING DEVICES

demand proof of performance for superior insulator quality



This is a 2660-foot span

Here is another example proving that all insulators are not alike. That is why Thomas welcomes competitive tests.

For example . . . in 1931, a large mid-western Utility was planning a 132-kv line and decided to make their own tests on competitive insulators.

RESULT: The R. Thomas & Sons Co. was awarded the contract for the insulators for this 69-mile line.

That the Customer's choice was right is evidenced by the following statement made recently by the Operating Department of this Utility:

"YOUR INSULATORS ON THIS LINE HAVE PERFORMED ENTIRELY SATISFACTORILY."

After all is said . . . it's still quality that counts plus proper designing, precision manufacturing . . . and PROOF OF PERFORMANCE. Since the beginning of the Electrical Industry, Thomas has been supplying porcelain for the most difficult insulating problems. Why gamble?

SPECIFY THOMAS INSULATORS—THE BEST BY LINE TEST

SINCE 1873

The R. Thomas and Sons Co.

LISBON, OHIO

NEW YORK CHICAGO

Sales Representatives: E. B. Anderson Co., *Detroit* • Paul Berry, *Oklahoma City* • Ken H. Best, *Seattle* • Butler & Land, *Dallas* • R. E. Cunningham & Son, *Los Angeles* • Electric Supply Co., *Albuquerque* • Engineer Sales Corp., *St. Petersburg* • R. F. Hamilton & Associates, *Denver* • R. H. Harper, *St. Louis* • Geo. E. Henn Company, *San Francisco* • W. J. Hugo, *Minneapolis* • Leiser & Company, *Philadelphia* • Lynn Elliott Company, *Houston* • W. C. Milburn, *Chattanooga* • John G. Pettijohn Company, *Knoxville* • H. E. Ransford Co., *Pittsburgh* • Redmond Supply Co., *Phoenix* • J. F. Schaefer & Co., *Kansas City* • R. J. Sullivan & Company, *Boston* • Walter E. Thompson, *Birmingham* • E. E. Torkell, *Memphis* • Triangle Electric Supply Company, *El Paso* • United Electric Supply Co., *Salt Lake City* • Joe Williams, *Little Rock* • *Representatives in other principal cities*

BURNDY

is a Past Master

in CONNECTORS

NA

for ALUMINUM CONDUCTORS

For the past ten years, and more, the problems of connectors for aluminum have been a major study project at Burndy. Today, aluminum cable and accessories play an ever-greater part in the utility picture. And Burndy is prepared not only with a complete line of power connectors for use with aluminum conductors but with the authoritative answers to vital questions that are bound to arise.

For data on the most efficient connector designs and finishes for particular applications — aluminum-to-aluminum, aluminum-to-copper . . . for best methods of inhibiting contact corrosion . . . for personal analysis and specific recommendations, write to Burndy.

UH

BURNDY NEW YORK 54, N. Y.

Western Branch: Vernon 58, Cal. • Burndy Canada Ltd., Tor. 8, Ont.

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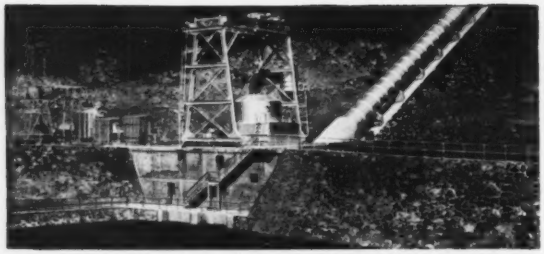
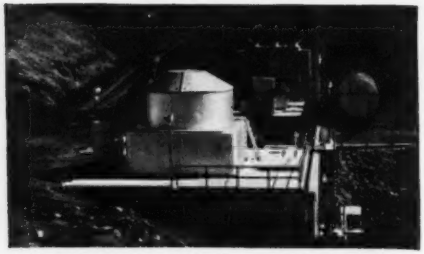
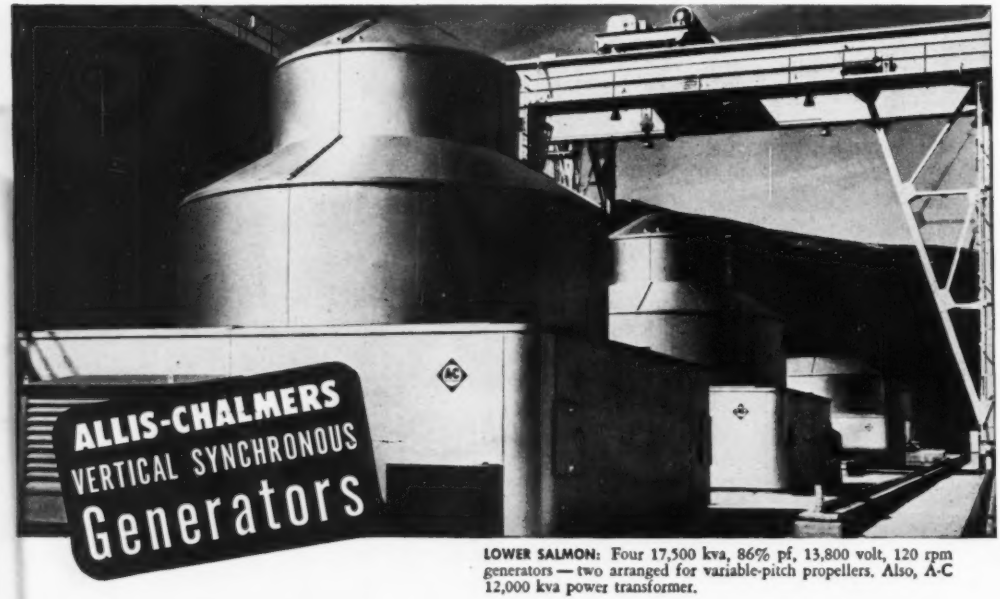


UPPER MALAD: One 8400 kva, 85.7% pf, 6900 volt, 225 rpm generator. Also, A-C 12,000 hp, 124 ft head Francis-type turbine, station-service substation, switchgear, main power transformer.



LOWER MALAD: One 15,500 kva, 87% pf, 6900 volt, 200 rpm generator. Also, A-C 22,000 hp, 157 ft head Francis-type turbine.

All generators are modified umbrella type (with upper guide bearings) furnished complete with outdoor housings.



LOWER SALMON: Four 17,500 kva, 86% pf, 13,800 volt, 120 rpm generators — two arranged for variable-pitch propellers. Also, A-C 12,000 kva power transformer.

"OPERATION AND MAINTENANCE ... Very Satisfactory"

THAT's the verdict of Mr. Lester Garlinghouse, plant superintendent of Idaho Power's new Lower Salmon, Upper Malad and Lower Malad stations. It's natural that the six Allis-Chalmers hydraulic-turbine-driven generators in these stations should be highly satisfactory: They are the result of more than 40 years' experience designing and building large generators.

Placed in operation in 1948 and 1949, these generators supply southern Idaho as part of the Northwest power pool. The Malad stations, which are remote-controlled from the Lower Salmon station, operate 24 hours a day, seven days a week. Lower Salmon is used for load factoring (peak load operation) and runs at full load an average of about 10 hours a day every day of the year.

Whatever your power requirements are, you can rely on Allis-Chalmers for efficient, reliable generators custom-engineered for your installation. Types, ratings and construction features are described in new bulletin 05B7549. Contact your A-C representative, or write Allis-Chalmers, Milwaukee 1, Wis.

A-3446

ALLIS-CHALMERS

GOULD

Plus-Performance Plan

. . . BRINGS YOU THE COMPLETE STORY ON

LEAD-CALCIUM BATTERIES!

You can depend on the GOULD PLUS-PERFORMANCE PLAN to give you the latest and fullest information on any battery development or problem. Now, this plan gives you the full story on lead-calcium batteries!

The GOULD PLUS-PERFORMANCE PLAN is a complete system of manuals, articles, specifications, bulletins, record cards, charts and graphs, which explains and illustrates how to select, charge and handle, maintain and determine the condition of your batteries. To this basic technical information has been added material on battery power's newest development—lead-calcium cells.

All material is available to battery users without obligation. Simply indicate your type of battery service and the points on which you wish information. A special portfolio containing technical information will be forwarded promptly.

PRODUCT OF 20 YEARS OF RESEARCH

The new lead-calcium battery is the result of twenty years of research. Gould is manufacturing this new battery development under the original patents. In order that you may have information as to where the lead-calcium battery can be used and what can be expected from it, the GOULD PLUS-PERFORMANCE PLAN presents the following as a

Summary of Test Trends

Lead-Calcium Batteries . . .

1. **Are for full-float service.**
2. **Give longer life.**
3. **Require fewer equalizing charges.**
4. **Reduce water additions.**
5. **Require less float current.**
6. **Lower maintenance costs.**

Reprints of technical papers on lead-calcium cells may be obtained by writing, attention Field Engineering Department.

WRITE FOR THIS FREE BOOKLET

If you wish further information concerning the GOULD PLUS-PERFORMANCE PLAN, this booklet will be sent you by return mail.

GOULD
For fifty years, the Choice of Engineers

GOULD STORAGE BATTERIES

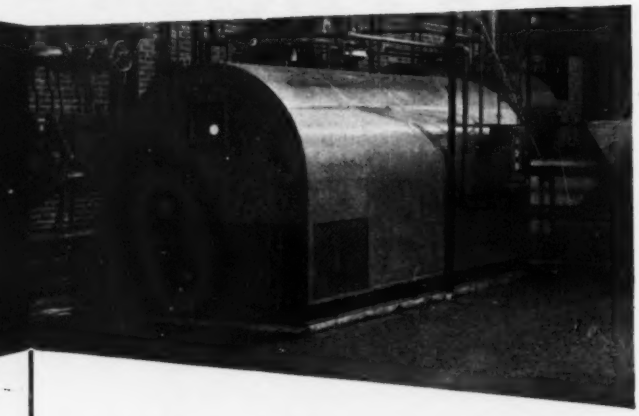
GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

Always Use Gould-National Automobile and Truck Batteries

CARDOX — Originator

of LOW PRESSURE Carbon Dioxide FIRE EXTINGUISHING SYSTEMS*

Offers You Experience Gained Through Thousands of Successful Installations



APPROVED BY:

Underwriters' Laboratories, Inc.
Manual Systems—1940
Automatic Systems—1941

Factory Mutual Laboratories
Manual Systems—1942
Automatic Systems—1942

First Installation—1939

CHOSEN BY:

The "Who's Who" of American Industry

38 of the nation's 50 leading corporations

14 of the nation's 25 largest utilities

Hundreds of other plants in scores of fields

Researched — Pioneered — Perfected — and Patented* by CARDOX

When you are considering a fire extinguishing system you want *facts,* not *claims*—protection based upon *experience,* not *experiment.* In low pressure CO_2 systems, that means CARDOX—and *only* CARDOX.

CARDOX originated and created low pressure CO_2 fire extinguishing systems. Millions of dollars spent by CARDOX in research . . . decades of experience and progress telescoped into a dozen years by war and top priority projects—have given CARDOX a supremacy in technical and engineering knowledge that is unduplicated.

Thousands of CARDOX Systems protecting the "hot spots" of industry—for which only CARDOX Systems were adequate—have saved untold millions in stopping fire and production losses.

On the face of it, there is no "equivalent" to CARDOX. When hazards are tough—and call for protection by low pressure CO_2—*they call for CARDOX.*

Tell us when we can help *you!*

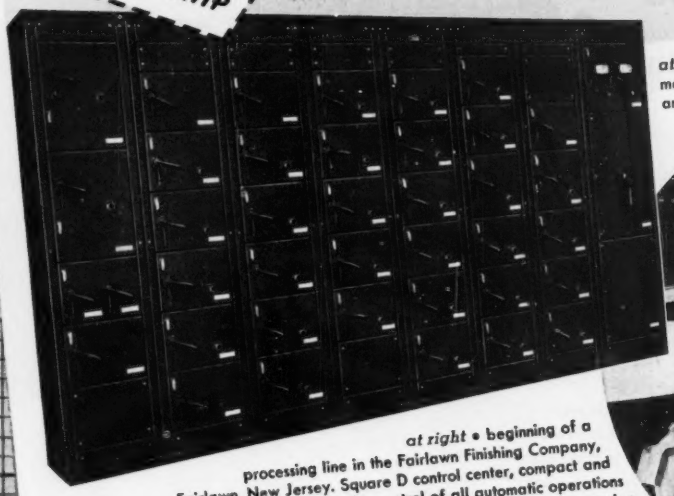
*Covered by CARDOX Patents, issued and pending.

CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS • Offices in Principal Cities

DESIGN LEADERSHIP

SQUARE D "PLUG-IN" Control Centers



at left • Control center with main breaker, metering panel, 33 combination starters and 6 branch breakers.

at right • beginning of a processing line in the Fairlawn Finishing Company, Fairlawn, New Jersey. Square D control center, compact and out of the way, provides control of all automatic operations in applying water-repellent finish on nylon.

for ECONOMY · SAFETY · FLEXIBILITY

ECONOMY in installation because factory assembly has done most of the work of mounting and wiring individual motor starters. For easy wiring, large vertical and horizontal gutters are front accessible without removing units. Economy of space because standard 20"W x 20"D x 90"H sections accommodate up to six combination motor starters.

SAFETY because bus structure is rigidly supported on porcelain insulators and is designed to withstand short circuits up to 25,000 amperes. Safety because dead front handle mechanism always indicates true position of circuit breaker or switch and can be locked off with one to four padlocks.

FLEXIBILITY because plug-in units may be removed, added or exchanged at will. Both fusible switch and circuit breaker types are available. Flexible because standardized sections and units are always re-usable after plant conversion.

Your nearby Square D Field Engineer will give you the complete story . . . or write for BULLETIN 8938. Address **Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin.**

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

DETROIT · MILWAUKEE · LOS ANGELES

SQUARE D COMPANY CANADA LTD., TORONTO • SQUARE D de MEXICO, S.A., MEXICO CITY, D.F.

Here's a great new Burroughs to speed your ledger posting

Never before have utilities had the opportunity to mechanize ledger posting at such moderate cost—because never before has there been a medium-priced machine so flexible and fast, so easy to operate, as the sensational Burroughs Sensimatic.

This is the all-new, amazingly versatile figuring tool—the machine with a "mechanical brain" that directs it through every accounting job swiftly, easily, accurately. The Sensimatic makes possible the complete mechanization of all your posting work from a single machine.

Investigate now. Learn how the Sensimatic can save dollars, hours and effort . . . how surprisingly little it costs to own. Write for complete information. Burroughs Adding Machine Co., Detroit 32, Mich.

Handles all These Jobs *and more*

- Operating Ledgers
- Work Order Ledgers
- General Ledger
- Material and Supplies Ledgers
- Bank Ledger
- Revenue Ledgers
- Accounts Receivable Control Ledgers
- Stockholders Ledger
- Operating Statements

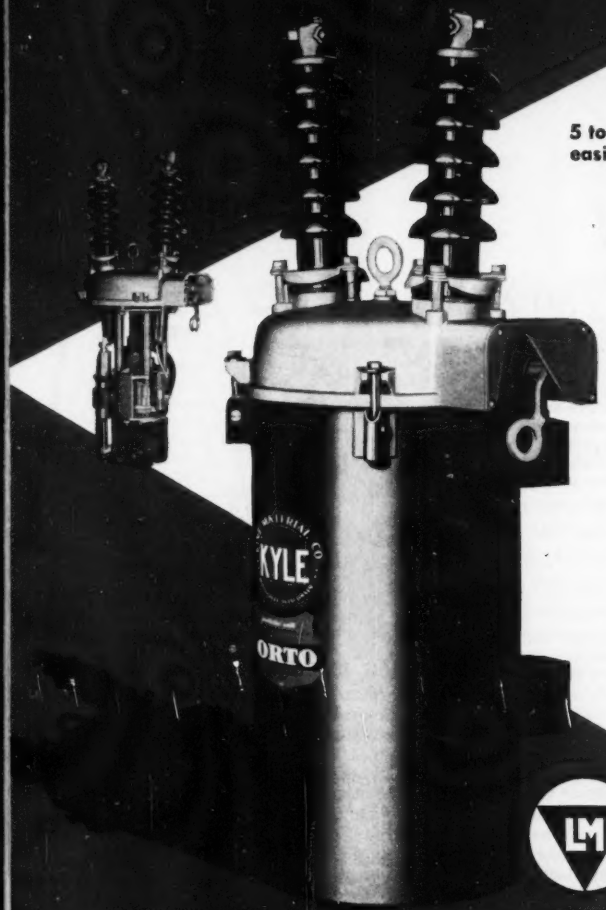
It's the Sensational

Burroughs Sensimatic

accounting machine

WHEREVER THERE'S BUSINESS THERE'S **Burroughs**

NEW KYLE 23 KV



Interrupting capacity 1500 amperes at 23 kv

150 kv basic impulse level

Cross-blast arc extinction

5 to 100 ampere ratings; rating rapidly and easily changed in the field

L-M's new KYLE type E recloser is specially designed for 23 kv service. The type E has exceptionally strong construction, with large contacts of finest arc-resisting material. The oil cross-blast feature insures very rapid extinction of the arc.

The recloser provides ample protection for circuits with loads up to 100 amperes and fault currents up to 1500 amperes. It is extremely accurate, with dependable hydraulic timing proved by years of field experience. In fact, well over half the reclosers in service today are Kyles! Type E's will coordinate with one another as well as with fuses on branch circuits.

The unit provides up to three successive reclosures plus final opening to lockout. Choice of three operating curves, seven operating sequences. Has all the Kyle safety features. Built-in coil protection. Radio noise-free. Meets applicable AIEE and NEMA standards or proposed standards, and is REA-accepted. Filled with ORTO®, L-M's inhibited oxidation-resistant transformer oil, for longer life.

Get the Whole Story

Ask the L-M Field Engineer to tell you all about this new Kyle type E recloser; or write for copy of bulletin to Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

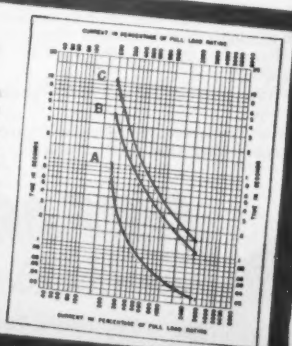
42

LM®

LINE MATERIAL

Choice of Seven Sequences

Kyles are the only reclosers offering choice of at least three time-current curves and seven tripping sequences. Curve A, fast; curve B, retarded; curve C, extra retarded. Sequences quickly and easily changed in the field by changing one or two small parts. No extra shop trips!



Now you get DOUBLE holding power

L-M Guy Clamps with TORKOL-Treated Nuts Work Faster, Easier!

Now you can use *one* guy clamp where you formerly used two! Tests show that with Torkol nut lubricant—an L-M "exclusive"—wrench torque develops twice the normal holding power of an untreated clamp. High strength, heat-treated bolts assure plenty of extra strength.

THESE TESTS TELL THE TORKOL STORY

Recent tests compared the holding power of Torkol-treated 3-bolt clamps with untreated 3-bolt clamps. The pull required to produce ⅛-inch slip of the guy strand was measured for a wide range of wrench-torque values. Results were plotted into comparative "Nut-Torque vs. Holding Power" curves shown at the right.

SEE WHAT A DIFFERENCE!

To hold a pull of 7000 pounds, using ⅜" high strength guy strand and clamps with ⅝" dia. bolts, required the following nut torques:

with *un*treated clamps, 120 foot-pounds torque;

with Torkol-treated clamps, 52 foot-pounds—less than half as much!

The extra holding power of L-M Torkol-treated guy clamps often permits the use of a clamp with smaller bolts. For example: With 3-bolt clamps with ⅝" bolts, on ⅜" HS strand, with 90 foot-pounds of torque:

*un*treated clamp held a 5800-pound pull;

Torkol-treated clamp held 12,400 lbs.

With a 3-bolt clamp with ½" bolts:

*un*treated clamp held a 3800-pound pull;

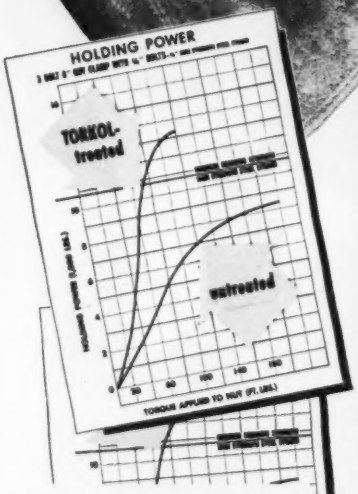
Torkol-treated clamp held 9700 pounds.

The Torkol-treated clamp with ½" bolts held 3900 pounds more than the untreated clamp with ⅝" bolts! The possible savings are obvious.

SERVES YOU BETTER—COSTS NO MORE

With L-M Guy Clamps, you save on material, cut installation time, and get far better strength-balance in the whole guying installation. What's more, Torkol-treated L-M clamps contribute to worker-safety, for they seldom require heavy muscular effort with its risks of straining and danger. *And L-M Torkol-treated clamps cost you no more!*

Torkol is a Line Material Trademark



GET THESE NEW FACTS ON "TORKOL"

Want a complete set of these new Torkol test curves? Eight charts cover the guy-strand range from ¼" to ½"—and permit coordination of guy clamp holding strength with that of other components. Ask your L-M Field Engineer, or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

L-M Guy Clamps are made in styles from one to four bolts, of heavily galvanized steel. Smooth grooves with rounded edges prevent strand damage. The high-strength bolts may be inserted from either side.

All nuts are Torkol-treated—identified by their yellowish color. They go on quickly, stay tight, unscrew easily, may be reused. Clean. Dry. Unaffected by weather or weather chanaes.

LINE MATERIAL

Line Construction Materials

Complete Coordinated Equipment for Distribution Today

Here is L-M's complete line of type PHD
5 KV HEAVY DUTY CUTOUTS

Up to 20,000 amperes interrupting capacity
Interchangeable Doors—standard, heavy duty, and switch blade types—in each rating
50 and 100 ampere doors fit your present PVD® cutouts

Here is the first and only complete line of cutouts for high power capacity distribution feeders. These cutouts provide extra high interrupting capacity *as you need it*, without the extra cost for needless high *continuous* current rating. You can install one of these new L-M cutouts with standard duty door. As feeder load requirements change and fault currents increase, you can change it to a heavy duty cutout, in just six seconds, by hooking on the heavy duty door. Or change it to a disconnect switch—either stationary or indicating. Or you can change over your *present* PVD's! Warehousing and stocking are simplified, costs are cut.

PHD is a Line Material Co. trademark.

OUTSTANDING DESIGN FEATURES

- Housings wet-process porcelain, glazed inside and out.
- Hanger supports cemented into back of porcelain housings.
- All current carrying parts silver plated.
- New clamp type terminals with easily accessible large-head screws.
- Replaceable "bakelined" fuse cartridge tubes resist weathering and arcing.
- Spring-actuated flip-out device pulls fuse link down and out of tube, assuring instant separation of link parts, even with the smallest links, and low fault currents.

ENGINEERED FOR SAFETY—The lineman can remove the door completely, re-fuse and replace it, all with a switch stick. When door is open, all door parts are dead.

400 ampere disconnect switch in indicating position
Through the use of this new, higher-rated switch blade, the 200 ampere cutout can now be converted simply and quickly to a 400 ampere disconnecting switch for use on higher nominal current systems. Door can be closed with hinged blade in disconnect position below the box, giving positive indication that the line is open—a unique L-M feature.

L-M HEAVY DUTY CUTOUTS

RATING	DOORS AVAILABLE	INTERRUPTING CAPACITY rms amperes 2.5 kv*	5 kv**
50 AMPERES	1. Standard duty, indicating	1,200 amp.	1,200 amp.
	2. Heavy duty, non-disconnecting	8,000 amp.	5,000 amp.
	3. Switch blade	100 amperes continuous current rating.	
100 AMPERES	4. Standard duty, indicating	3,000 amp.	3,000 amp.
	5. Heavy duty, non-disconnecting	14,000 amp.	10,000 amp.
	6. Switch blade	200 amperes continuous current rating.	
200 AMPERES	7. Heavy duty, indicating	20,000 amp.	15,000 amp.
	8. Switch blade	400 amperes continuous current rating.	

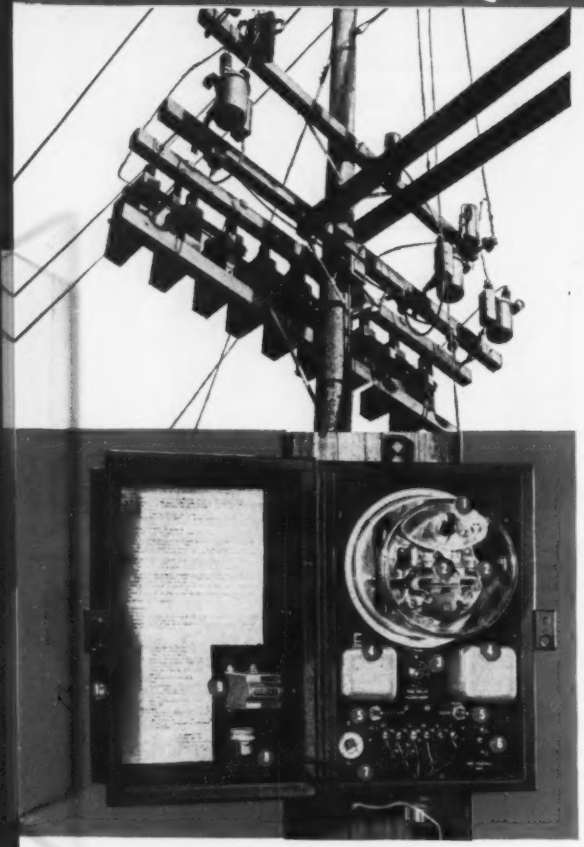
* or line-to-neutral 4160 or 4330 volts Gr. Y. ** or line-to-neutral 8320 volts Gr. Y.

GET THE WHOLE STORY—Ask the L-M Field Engineer for complete information, and copy of Bulletin on PHD Cutouts; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

55

LINE MATERIAL . . . fuse cutouts
Complete Coordinated Equipment for Distribution Today

this 225 kvar automatic switched capacitor installation



Less than $6.37 per kvar

for equipment including Elemex Capacitors, Kyle Type GR Switches, New L-M Voltage-Sensitive Control, Capacitor Racks, Cutouts, and Arresters

(Only $5.92 per kvar for 300 kvar bank for 4160 volt delta or 2400 volt wye.)

This unprecedented low cost of $6.37 per kvar for small banks of automatically switched capacitors is made possible through the introduction of L-M's new control equipment. At this low cost you are now justified in installing and taking advantage of all the dollar benefits switched capacitors can give you.

L-M's New Voltage-Sensitive Control

L-M's new voltage-sensitive control has been field-tested for more than two years, and is now in full production. Although fundamentally designed for controlling the Kyle type GR oil switch, its flexibility permits its use with other solenoid or motor-driven equipment, including large breakers.

Heart of the control is basically a watt-hour meter modified to make it volt-sensitive. Over 3/16" contact travel per volt (120 volt base) assures extremely sensitive operation. Voltmeter is temperature compensated to ±1% accuracy from −30° F to 140° F. Line voltage can be determined within this accuracy without the use of external portable instruments. Once band width and midpoint settings are established, they are accurately maintained and need no periodic checking.

Voltmeter is mounted in a standard meter socket. Installation can be completed and tested before meter is installed, so that the test engineer doesn't need to be present until the line crew has finished its work.

Arc-suppression and filter circuit assures complete freedom from interference at telephone, radio, or television frequencies.

L-M Voltage-Sensitive Control

1. Nominal line adjustment on voltmeter—110 to 130 v.
2. Band width adjustment—2 to 12 v. with recommended minimum of three volts.
3. Time delay adjustment—instantaneous to 4½ minutes. Synchronous motor drive unaffected by variation in ambient temperature or voltage.
4. Enclosed selector relays—carry full burden of oil switch driving mechanism.
5. Toggle switches permit automatic, test, or instantaneous manual operation of oil switches.
6. Line voltage test connections.
7. Fuse protects entire circuit.
8. Spare fuse plug.
9. Operation counter (optional).
10. Weather-proof cabinet with threaded conduit nipple and multiple knockouts.

Get the whole story. Ask the L-M Field Engineer for bulletin on Elemex Capacitors and information on L-M's complete switched capacitor installation and the new voltage-sensitive control; or write Line Material Company, Milwaukee 1, Wis. (a McGraw Electric Company Division).

LINE MATERIAL Capacitors

Completely Coordinated Equipment for Distribution Today

for faster underground installations

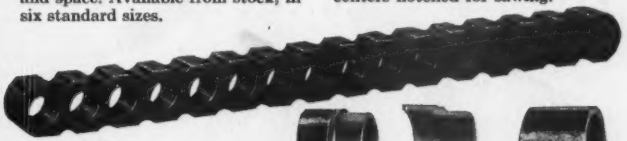
New L-M Spacers

New L-M Base Spacer:

assures rigid foundation, desired gradient. Interlocking ends; wide flat base—the spacer will not tip over during or after installation. All L-M spacers come in standardized cartons to save stockroom handling and space. Available from stock, in six standard sizes.

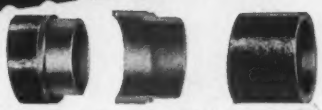
New L-M Intermediate Spacer:

made of asphalt and asbestos fibre, highly resistant to acids and alkalis, fire resistant, Underwriters' listed. Withstands vertical flat crushing test of over 1200 pounds. Grooved ends lock together with the next spacer; centers notched for sawing.



New L-M Bend Spacer Bar:

a duct-installation leveller, used horizontally or vertically for accurate alignment of conduit around bends. Saves hours of work in lining up. Offers a tremendous saving in installation labor costs. L-M exclusive. 20′ long, 1½″ square, easily sawed to length.



New L-M Multi-Use Bend Sections and Angle Couplings:

use in any combination to make all kinds of special bends and crossovers. Male and female tapers offset 2½°, giving 5° bend in each section. Smooth inside, watertight tap-tite joints.

The L-M System makes Fibre Conduit *so easy to use*

New L-M Fibre Conduit Vise

An easy, safe way to hold fibre conduit for sawing or tapering. For mounting on truck or bench, or with detachable tripod for use in the field, on the job.

With L-M Fibre Conduit and L-M equipment and tools, L-M's system speeds up underground installations, makes better jobs.

L-M Fibre Conduit is strong, light, tough; yet it's easy to taper and cut to length. L-M base spacers, intermediate spacers, and bend spacers assure a firm foundation and a rigid structure that won't settle or shift.

L-M tools save hours of time in the shop and on the job. Better get the low-down on this high-class, time-saving equipment.

GET THIS FREE HANDBOOK! Pocket-size manual covers recommended underground construction practices; contains valuable reference tables. Ask the L-M Field Engineer for a copy, also for new Fibre Conduit folder; or write Line Material Company, Milwaukee 1, Wisconsin (a McGraw Electric Company Division).

New L-M Tapering Tool

Cuts a precise 2° taper on the end of conduit to assure tight, snug joints. Light; easy to use; saves time; cuts costs by salvaging cut ends and short lengths quickly.

36.

LINE MATERIAL ... Fibre Conduit

Complete Coordinated Equipment for Distribution Today

PROTECTION AT ITS BEST with CRYSTAL VALVE'S

- Low IR voltage drop
- Ample surge discharge capacity
- Extremely marked valve action for follow current interruption
- No measurable deterioration
- Long service life

Lashing rainstorms . . . sub-zero temperatures . . . blistering summer heat can't affect the true valve action of Crystal Valves. The outstanding electrical characteristics of Oxidized Silicon Carbon grain used only in Crystal Valves make it ideally suited for application in lightning arrester operation. You get split-second protection for your power equipment against lightning "black-outs"—freedom from failure.

Get the complete benefits of proved protection . . . specify Crystal Valves for your power line equipment.

Write Dep't 1709 for latest technical data on lightning arresters and their installation. Ask for CV catalog. No obligation.

ELECTRIC SERVICE MANUFACTURING CO., PHILA. 32, PA.

CRYSTAL VALVE

LIGHTNING ARRESTERS

Lightning Arresters Valve Elements

by

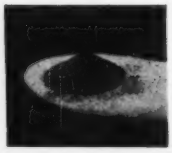
J. R. McFarlin, Vice President

ELECTRIC SERVICE MANUFACTURING CO.

The valve element of a valve type lightning arrester is always of interest to both the designer and to the user of such arresters. It operates much like a valve in that it can be "shut" or "open"—shut when its resistance is high, open when its resistance is low; it will show an infinite number of resistance values between given values of high and low. In a lightning arrester it is in series with a spark gap, the gap ordinarily connected to a line and the valve element connected to ground.

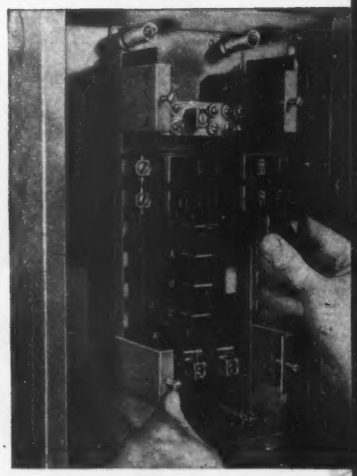
Lightning surges sparking over the gap will discharge to ground through the valve element, and the resistance of the element will change depending on the magnitude of voltage impressed across it or the current flowing through it—high resistance for low voltage or current, low resistance for high voltage or current; because of such characteristics it is referred to generally as a "non-linear" resistor.

Much research has been done on various materials possessing these "non-linear" resistance characteristics; perhaps the most has been based on silicon carbide crystals, both alone and in combination with other materials. Our Company has used silicon carbide of various characteristics, both in rod, block and discrete forms for lightning arresters over a period of more than 50 years; since 1925 usage has been entirely confined to crystals in discrete form rather than in rods or blocks.



In 1933, in cooperation with the Carborundum Company, *oxidized* silicon carbide grain was developed and has been used in discrete form for Crystal Valve lightning arresters since that time; this grain is produced by a rather complex treatment where the outer layer of each grain is changed from the solid crystalline silicon carbide to a layer of porous silica, the core of the grain still being the original silicon carbide. As compared with regular electrical silicon carbide, oxidized silicon carbide is characterized by lower unit internal impedance, by more marked inverse voltage/resistance or non-linear characteristics, by higher valve or arc-suppressive ability and by marked increase in thermal or current carrying capacity.

Advertisement



ANOTHER TALKING POINT IS THE BREAKER—Trumbull's new NLTQ Panelboard introduces the first *plug-in* circuit breaker with quick-make, quick-break operation. Other features: both *thermal* and *magnetic* protection . . . trip-free . . . pressure-type, silver-plated copper plug-in contacts . . . all ratings physically interchangeable. Adjacent breakers are on alternate phases—assuring balanced loads and circuits.

New insulating material

MAKES PANELBOARD SALES!

The base of this panelboard interior is made of *Plastisol* . . . the first time this amazing plastic material has been used for this purpose.

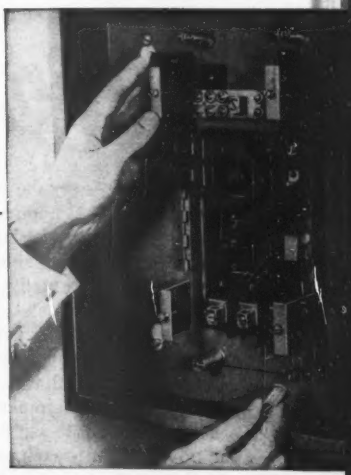
Here are some reasons for your recommending Trumbull's new NLTQ Panelboard to your customers.

Plastisol has very high thermal conductivity and is an excellent radiator of heat. Copper bus bars encased in Plastisol run 10% cooler than in open air!

SALES POINTS THAT OUT-SELL OTHER INSULATION

Other Plastisol advantages making it superior to all other types of insulation for this purpose include its ability to resist acid and alkali, high temperatures (not harmed at 212 F), tracking and carbonizing. It will not shrink or become brittle, even at minus 30 F.

Trumbull's Plastisol base is Underwriters' Laboratories, Inc. approved and endorsed by the Electrical Council.



YOUR CUSTOMERS WILL LIKE QUICK INSTALLATION—Interior is mounted in box by compression springs . . . which permit easy release for removal. Springs also permit lining up fronts regardless of uneven box installation. Trumbull NLTQ panelboards with lug or circuit breaker mains come in capacities up to 225 amperes in a range of 4 to 42 circuits. Write for Bulletin TEB-14.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

*862 years

OF ELECTRICAL EXPERIENCE

GraybaR

Officers and District Managers all began "In the Ranks"

Experienced men make an experienced organization—one that can be relied upon to serve you well.

Graybar, oldest and largest distributor of "everything electrical", has long since proved the soundness of this principal by continually filling key company posts from within.

The result? An experienced, close-knit management group who—as clerks, office boys, and salesmen—*themselves* helped build the foundation for Graybar's ever-growing list of customers.

It's easy, then, to see why—with the same opportunities for advancement—each and every Graybar employee has a powerful incentive to do his job well.

Graybar is totally owned by its operating and retired personnel. That's another reason why every Graybar employee is personally interested in meeting your electrical needs accurately, helpfully, and as rapidly as possible.

Graybar Electric Company, Inc., Executive Offices: Graybar Building, New York 17, N. Y.

185-99

A. H. NICOLL
President
Started 1911, as Sales Record Clerk

O. F. HESSLER
Vice President
Started 1906, as Clerk

E. W. CASHMAN
Vice President
Started 1913, as Clerk

W. E. HENGES
Vice President
Started 1913, as Receiving Clerk

A. C. LAMPERTI
Secretary
Started 1920, as Bookkeeper

R. B. WILKINSON
Treasurer
Started 1915, as Errand Boy

L. G. FIELDS
Richmond District Manager
Started 1924, as Warehouseman

W. FRAZIER
Kansas City District Manager
Started 1911, as Office Boy

W. E. GUY
Chicago District Manager
Started 1924, as Salesman

A. D. HAMMOND
Atlanta District Manager
Started 1906, as Clerk

R. W. KIMBERLIN
San Francisco District Manager
Started 1922, as Sales Record Clerk

C. E. KIRKPATRICK
Cleveland District Manager
Started 1936, as Quotation Clerk

J. P. LAWTON
Seattle District Manager
Started 1923, as Warehouseman

G. T. MARCHMONT
Dallas District Manager
Started 1908, as Service Clerk

E. E. MARTIN
Boston District Manager
Started 1920, as Service Clerk

J. A. MAYER
Philadelphia District Manager
Started 1913, as Equipment Installer

C. H. McCLEAN
Minneapolis District Manager
Started 1913, as Warehouseman

HERBERT METZ
New York District Manager
Started 1914, in Student Course

C. S. POWELL
St. Louis District Manager
Started 1914, in Student Course

R. B. SAYRE
Jacksonville District Manager
Started 1921, as Warehouseman

S. W. SCOTT
Los Angeles District Manager
Started 1928, as Salesman

D. WALLACE
Pittsburgh District Manager
Started 1922, as Assistant Accountant

L. B. WESTFALL
Cincinnati District Manager
Started 1916, as Service Clerk

E. R. YONKERS
Detroit District Manager
Started 1933, as Salesman

V. A. ELMBLAD
Dallas Assistant District Manager
Started 1920, as Warehouseman

J. E. FONTAINE
Houston Assistant District Manager
Started 1928, as Warehouseman

***AVERAGE SERVICE 34 YEARS**

100,000 first-quality electrical items are distributed throughout the nation...

via GraybaR

IN OVER 100 PRINCIPAL CITIES

Industrial power plant for a large mid-west brewery designed and built by Kuljian

THESE savings are for the man planning more power facilities.

Unified, single contract responsibility effects large savings in engineering and construction of industrial power plants when coupled with the long experience and successful record of the Kuljian organization.

The Kuljian System includes preliminary planning, design, procurement, and construction. Organized to function smoothly and effectively, the Kuljian System saves you time and money.

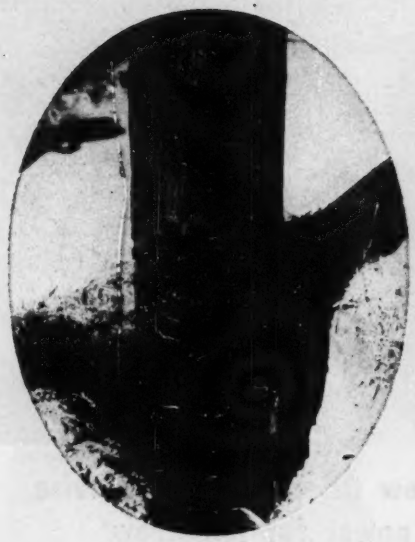
The Kuljian Corporation is engaged in designing and building power plants for diversified industries and utilities throughout the world. For power that pays, build the Kuljian way under the Kuljian System of *unified engineering and construction responsibility.*

The Kuljian *Corporation*

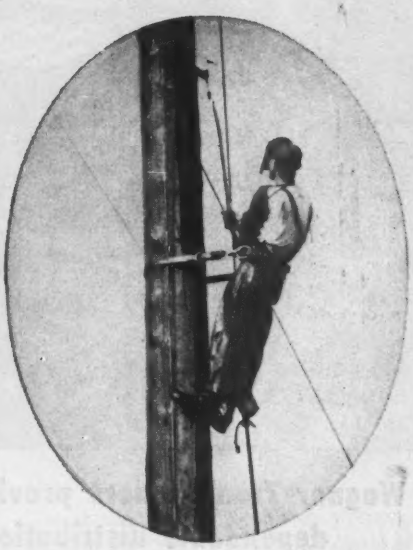
ENGINEERS • CONSTRUCTORS

1200 NORTH BROAD STREET, PHILADELPHIA 21, PA.

New preservation methods add years of life to standing poles



POL-NU is easily applied with simple pressure grease equipment. A grease-impervious covering is then wrapped around the treated area.



Applying the PENTA Preservative with special spraying equipment, the worker starts at the top and comes down . . . working around the pole.

GROUND LINE TREATMENT with Chapman Pol-Nu

This new wood preservative, in grease form, was developed for ground line treatment of untreated poles or of old butt-treated poles needing added protection. It contains 5% PENTAchlorophenol by weight. Tests prove that on application the preservative penetrates the vulnerable sapwood to give lasting protection against destructive ground-line decay and insect attack. The application of Pol-Nu gives several years of additional service life at an average cost of only 50c to 75c per year.

ABOVE GROUND TREATMENT with Penta Preservative

This new preservation method is for full-length protection of standing poles originally given only ground-line treatment. Penta is ideal for this purpose because it is highly toxic to wood destroying fungi and penetrates readily at normal temperatures. This effective preservative is permanent, economical, safe to handle, non-poisonous to animals. Tests have proven that Penta definitely stops shell rot and top rot. It's clean! It's certain! Conforms to A.W.P.A. Specifications P8-49 and P9-49.

Write for complete data and recommendations on these new methods.

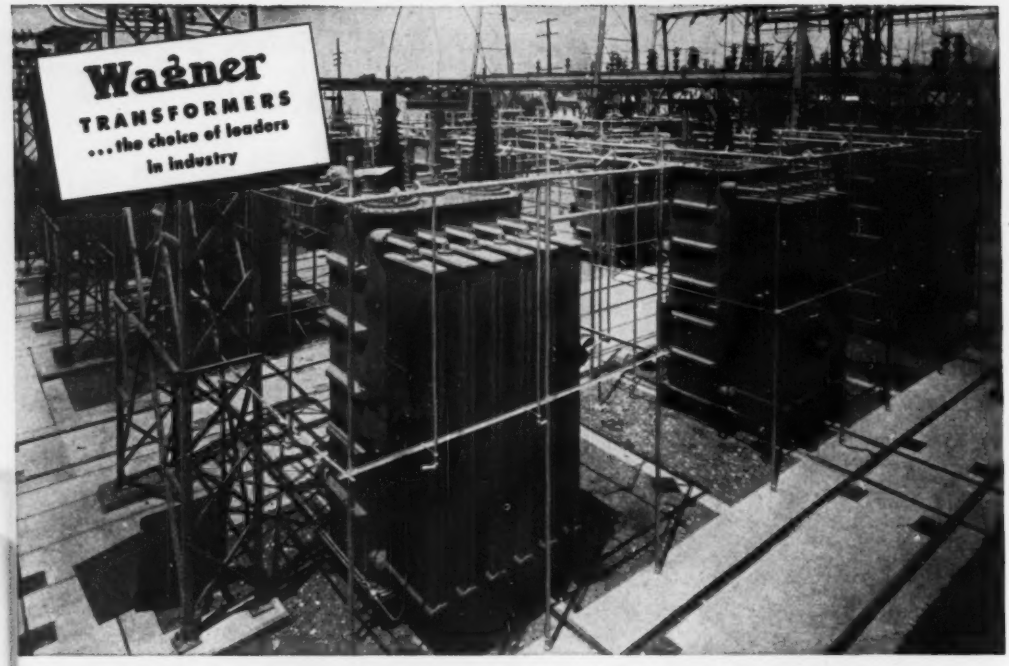
CHAPMAN™

CHAPMAN CHEMICAL COMPANY

Dermon Building, Memphis, Tenn.

333 No. Michigan Ave., Chicago 1, Ill.

Terminal Sales Building, Portland 5, Ore.



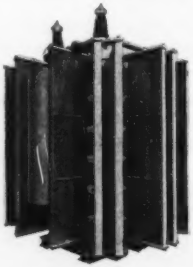
Wagner Transformers provide New Orleans Public Service dependable distribution of power for tomorrow

The new Midtown Substation of New Orleans Public Service, Incorporated, helps assure a plentiful supply of vital electricity for the steadily increasing needs of New Orleans and its rapidly-expanding industrial area.

The ten oil-filled Wagner Power Transformers used in this substation are each rated 5000 kva self-cooled, 6667 kva forced-air-cooled, 115,000 volts Delta to 13,800 volts Y, with full capacity taps at 110,000, 104,500, and 99,000 volts, and reduced capacity tap at 93,500 volts.

Wagner transformers are an important part of the equipment of many power companies because they have a reputation for unfailing dependability established through sixty years of service to the power industry. The complete story is told in Bulletin TU-181—you should have a copy.

Call the nearest of our 31 branch offices for competent advice on your next transformer installation.



Wagner Electric Corporation
1891 WE 1951

TU-11

WAGNER ELECTRIC CORPORATION
6456 Plymouth Ave., St. Louis 14, Mo., U.S.A.

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 31 PRINCIPAL CITIES

public utilities

GET THE JOB DONE WITH

MALL CHAIN SAWS

Out on the "line" telephone and power maintenance men like the job Mall Chain Saws do. Hundreds of times each week, hazardous obstructions to communications are removed —fast, easily and safely.

Take the Model 1E12 shown at work as an example. Mall designed this hand chain saw for difficult cutting work. It's 11 pounds light —easy to operate from any position. Cuts limbs or trees up to 24" in diameter. Has a rugged universal electric motor powered by the Mall 1DC Generator.

Use it for cutting propping timber, poles, cutting out tree roots and hundreds of other jobs. See your local Mall dealer for a demonstration of Mall Chain Saws. Choose from ten models.

MALL TOOL COMPANY

EXECUTIVE OFFICES: 7826A S. Chicago Avenue, Chicago 19, Ill.

FACTORY SALES and SERVICE BRANCHES IN 33 PRINCIPAL CITIES

Chain Saw Movies Are Available for Special Showing to Interested Groups.

1

Whatever your utility body needs may be . . . from a set of compartment sections for a pick-up truck to a line body capable of handling the largest construction job . . . there's a POWERS-American Body designed to meet your requirements.

Available for construction, maintenance, and service work in all phases of the public utility industry, POWERS-American Bodies are "job-engineered" to step up crew efficiency and lower operation costs. Their quality construction guarantees long life and trouble-free service.

Whether your needs be large or small, standard or special, you'll find it a real economy to call POWERS-American . . . the 1 source for all types of utility bodies and equipment.

Look at all the features you get in POWERS-American Bodies

"Job-engineered" design • Equalized load distribution • Extra large weathertight compartments • Triple-seal compartment doors • Recessed slam-action door catches, with cylinder locks keyed alike • Additional line body features include: low-positioned rubber goods compartment • Full-size compartments on street side • Derrick stowed without interference to cab door or loss of compartment space • Extra depth in all compartments • Horizontal compartments for long material.

"THE ACCEPTED STANDARD WITH UTILITIES EVERYWHERE"

POWERS American DIVISION

ACB

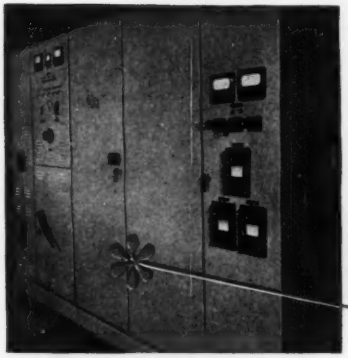
PUBLIC UTILITY BODIES AND EQUIPMENT

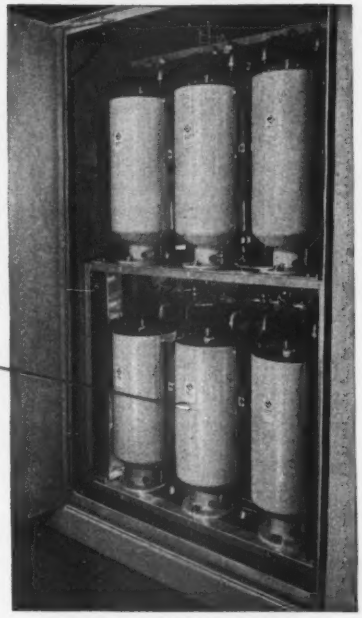
McCABE POWERS AUTO BODY CO., 5900 N. BROADWAY • St. Louis 15, Mo.

Sales Representatives in Principal Cities

Don't build around obsolete DC supply

—RETIRE IT NOW!





Modern Allis-Chalmers factory packaged, sealed tube, 500 kw mercury arc rectifier as installed in midwestern industrial plant. Left: "dead-front" compartments for dc feeders, dc metering and cathode breaker, rectifier tubes, and ac control and metering. Right: interior view of mercury arc rectifier tube compartment.

NOW IS THE TIME to retire obsolete converting and generating equipment. As operations expand, this inadequate equipment will become a growing handicap.

Now too — while there is a favorable base for amortization — is the time to consider mercury arc rectifiers for your expansion plans. Let Allis-Chalmers show you how the *modern* mercury arc rectifier can improve your direct current service.

LOW MANPOWER REQUIREMENT. With push-button starting and no synchronizing required, attendants are not needed during normal operation. Downtime for maintenance is reduced with no moving parts to lubricate or wear.

LOW COST OPERATION. Conversion efficiency is higher at all loads with large power savings during light load periods.

CONVENIENT INSTALLATION. Factory packaged, light in weight, and requiring no special foundation, Allis-Chalmers mercury arc rectifiers may be placed right at the load center.

IMPROVED PLANT OPERATION. With dc load center installation, distribution distances are cut, dc feeder losses are reduced, and full voltage is available at production equipment.

Whatever your specific direct current needs, Allis-Chalmers builds suitable and truly modern mercury arc rectifiers to meet them.

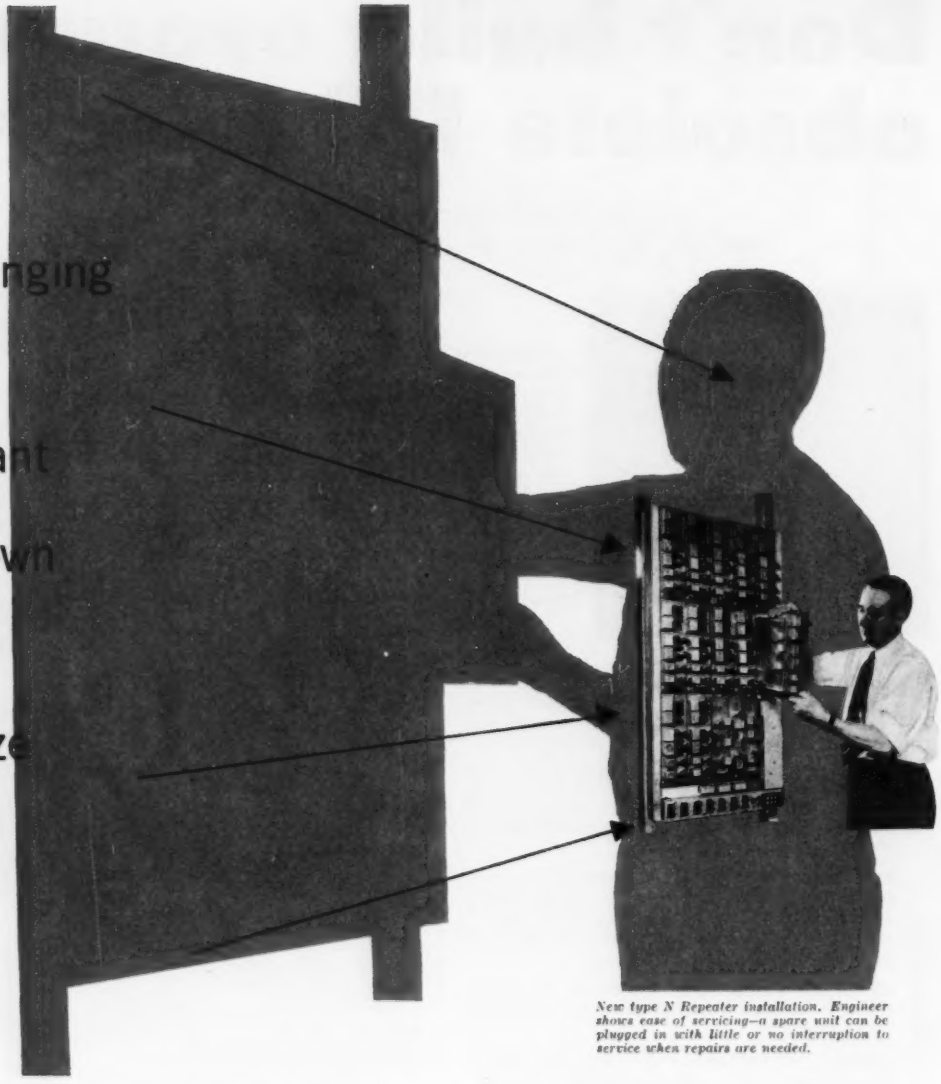
Sealed tube rectifiers (as shown above) are supplied in ratings from 200 to 1000 kw for lighter duty service. These are commonly used in large buildings, industrial plants and electric haulage systems. Pump evacuated rectifiers are built from 750 kw to the largest ratings required for heavy duty applications.

An Allis-Chalmers representative will be glad to explain in detail how these modern mercury arc rectifiers will improve the operation of *your* direct current system. Call your nearest A-C office or write to Allis-Chalmers, Milwaukee 1, Wisconsin. A-3467

ALLIS-CHALMERS A-C

MERCURY ARC RECTIFIERS

bringing a giant down to size



New type N Repeater installation. Engineer shows ease of servicing—a spare unit can be plugged in with little or no interruption to service when repairs are needed.

"CARRIER SYSTEM" telephony is economical, because many voices use the same pair of wires. But the extra equipment needed formerly limited it to the longer distances.

Now Bell Laboratories have developed new short-haul carrier, economical down to 25 miles, sending 12 conversations on two pairs of wires in a cable.

Keys to the new system are new circuits, miniature tubes, pocket-size wave filters and Permalloy "wedding ring" transformer cores that will barely slip over a man's finger. New manufacturing processes were developed in co-operation with the Western Electric Company. Components are pressed into a plastic mounting strip with heat, a score at a time, instead of being mounted separately.

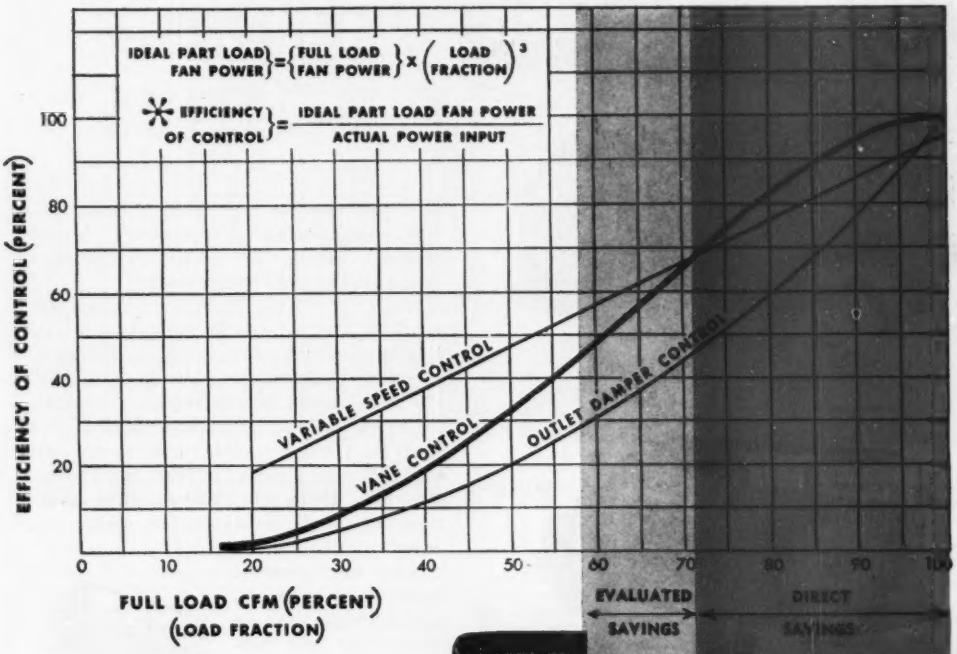
With this new carrier system more service can be provided without laying more cables. Tons of copper and lead can be conserved for other uses. It's another example of how science takes a practical turn at Bell Telephone Laboratories, to improve service and to keep its cost down.

BELL TELEPHONE LABORATORIES

WORKING CONTINUALLY TO KEEP YOUR TELEPHONE SERVICE ONE OF TODAY'S GREATEST VALUES

FOR PART LOADS

USE STURTEVANT VANE CONTROL® FOR HIGH EFFICIENCY AT LOW COST



If you operate in this range—and most plants do – VANE CONTROL is the economical choice

Have you ever considered the relative efficiencies of methods of mechanical draft fan volume control—and then evaluated them against first cost? Do so, and you will find Sturtevant Inlet VANE CONTROL is the best. It is high in *efficiency of control** and low in first cost.

Whether for forced or induced draft, the *new* VANE CONTROL is a simple and reliable regulator of fan output—a control which responds instantly to varied demands, and yields major power savings at reduced loads.

A new Bulletin, DB 92-810, describes the mechanical improvements developed for Sturtevant VANE CONTROL and its use in mechanical draft, industrial and ventilating applications. Write today for a free copy. Westinghouse Electric Corp., Sturtevant Division, 160 Damon St., Hyde Park, Boston 36, Mass.

YOU CAN BE SURE...IF IT'S **Westinghouse**

PUTTING *Air* TO WORK

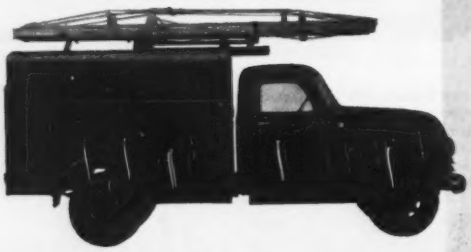
J-80220

Formula for Efficient Utility Service

...start with HOLAN UTILITY BODIES

Line body models for chassis with cab to axle lengths of 60" to 120" for all types of line construction and maintenance work.

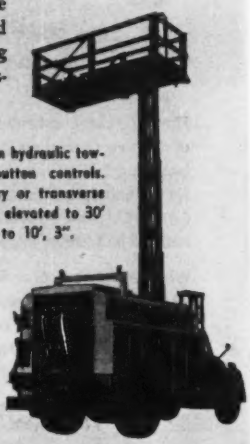
General service bodies have high roof, low roof or open top and can be mounted on any chassis with ½ to 1½-ton rating.



Give your men the opportunity of doing their line construction and maintenance work more efficiently. Supply them with one of the many modern Holan utility body models.

Holan utility bodies have the advantages that are important to men in the field. Curbside loading eliminates extra running by storing all frequently used tools and materials on the curb side of the truck. Derrick troughs at shoulder height eliminate lifting heavy poles high overhead. Trays with adjustable partitions eliminate mixing of small parts. All tools are stored within easy reach. These, plus numerous other advantages, help your men do the job quicker . . . better . . . more efficiently.

Holan has a complete line of utility bodies and equipment plus servicing facilities for your present equipment.



New model Holan hydraulic tower has push button controls. Stationary, rotary or transverse platform can be elevated to 30' height, lowered to 10', 3".

Model 1520 light weight ladder elevates platform to 23 feet. When not in use ladder leaves truck bed clear for other work.

J. P. HOLAN CORPORATION

[illegible] Cleveland 17, Ohio

Compare for Quality and Engineered Features

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Schultz Equipment Co.
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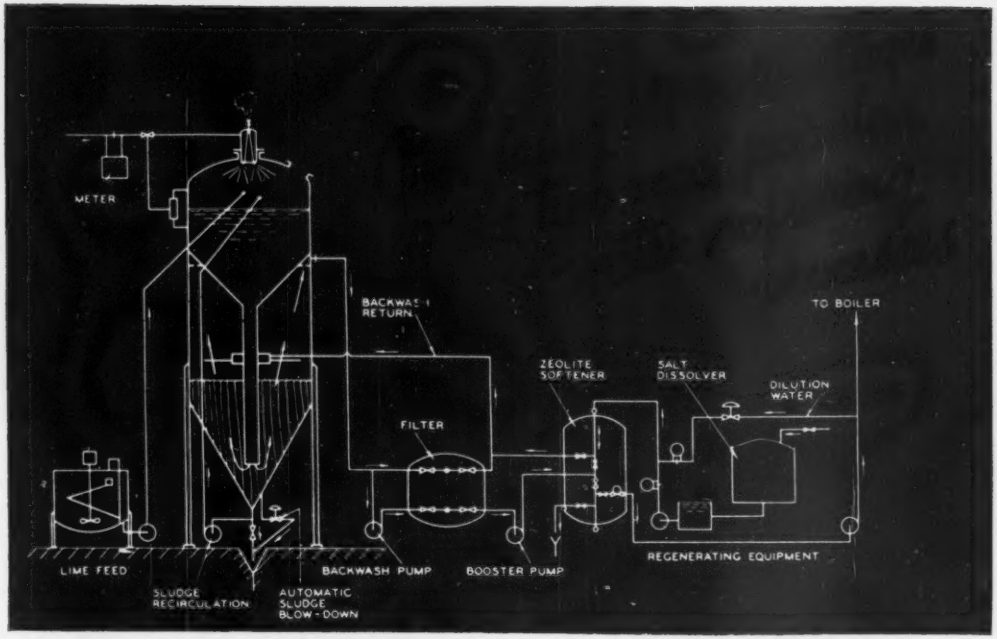


COCHRANE HOT PROCESS ZEOLITE SOFTENER

1. saves chemicals
The zeolite softener uses salt instead of the more expensive soda ash and phosphates, bringing down the cost of chemicals considerably.

2. saves on capital investment The cost of adding zeolite equipment to a hot process installation is far less than the addition of an independent sedimentation tank and chemical feed for a two-stage phosphate process.

3. lower CO_2 in steam
The lower alkalinity resulting from using lime alone, plus the fact that this alkalinity is all carbonate, causes a reduction in CO_2 generated in the steam.

4. less operating attention The use of the zeolite softener with its simplicity of operation is an advantage which is enhanced by the longer periods between regenerations, due to the lower hardness of the hot process softener effluent.

5. less floor space and head room required
The addition of the zeolite equipment requires less floor space and less head room than that required for two stage phosphate equipment.

6. lower alkalinity The use of lime (or Dolomitic lime) as the sole reagent in the hot process means that the alkalinity can be reduced to about half that obtained with lime and soda ash.

7. only one chemical needed in the hot process It is generally possible to use a single reagent in the hot process, namely lime or Dolomitic lime, precipitating the bicarbonates and magnesium, leaving the remaining hardness to be removed by the more economical zeolite.

Write for a copy of Publication 4801, giving complete details on this new and economical process

COCHRANE CORPORATION • 3146 N. 17th St. • Philadelphia 32, Pa.
In Canada: Canadian General Electric Co., Ltd., Toronto • In Mexico: Babcock & Wilcox de Mexico, S. A., Mexico City • In Europe: Recuperation Thermique & Epuration, Paris

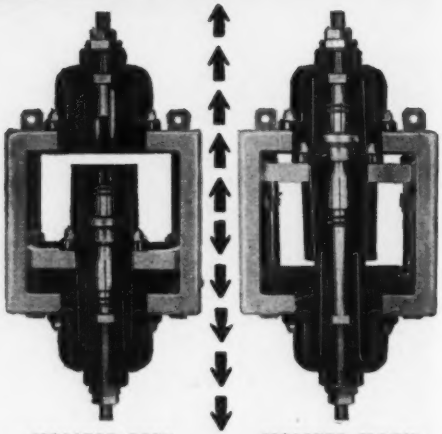
COCHRANE

It's The STRAIGHT LINE MOTION That Makes The Difference

All high voltage disconnects, including the ISOLATOR, have insulators, an upper and lower contact, and a movable member.

What is it then, that gives the ISOLATOR its superiority?

The answer can be given in four words.

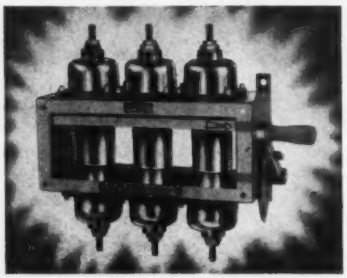


ISOLATOR OPEN ISOLATOR CLOSED

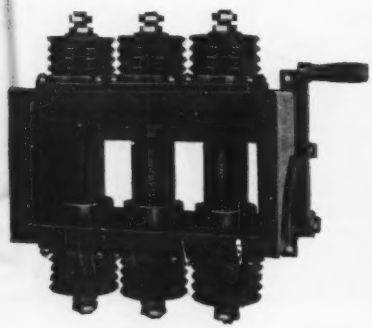
The straight line motion of the ISOLATOR permits the insulator units to take the form of bushings. The middle bushings telescope inside the upper and lower ones effectively shielding live parts. Furthermore the stud terminals in the upper and lower bushings are arranged for easy taping. Consequently, the ISOLATOR provides protection against accidental shock.

The straight line motion working in conjunction with the telescoping action of bushings save space because the overall dimensions of the ISOLATOR remain constant in both its open and closed positions.

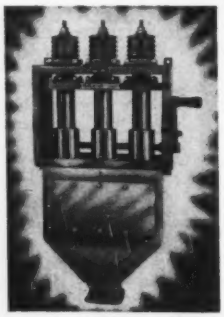
The insulator bushings also act as barriers between phases eliminating the necessity for using the customary flash barriers.



Cat. ST-603-3 3.P.S.T. 200 ampere 5000 volt ISOLATOR



Cat. ST-106-7 3.P.S.T. 600 ampere 7500 volt ISOLATOR



Cat. SC-102-55 3. P.S.T. 400 ampere 15kv CABLE ISOLATOR

Combined with a Cable End Bell body the ISOLATOR becomes a Cable ISOLATOR. This constitutes a disconnect and a Cable End Bell in one compact piece of equipment, saving space, materials and installation labor.

Ask For Bulletin 140

THREE E

ELECTRICAL ENGINEERS EQUIPMENT CO.

MELROSE PARK, ILLINOIS

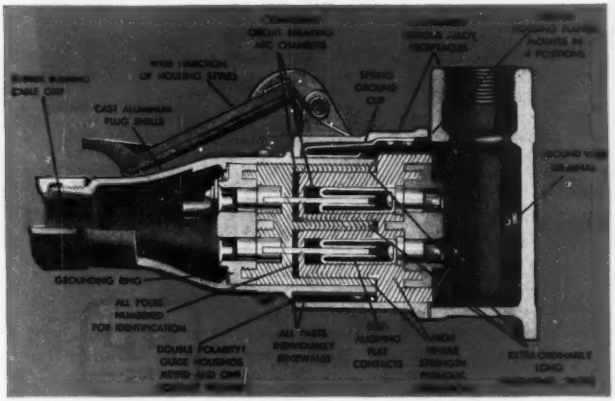
SAFE • DURABLE • DEPENDABLE

PYLE-NATIONAL

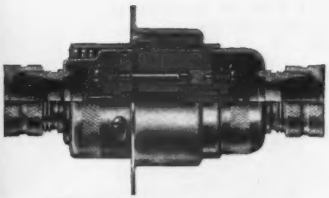
Heavy Duty Plugs and Receptacles

FOR PORTABLE ELECTRICAL EQUIPMENT

Pyle-National plugs and receptacles are built to withstand the most severe operating conditions, as proven by years of remarkably dependable service in a wide variety of industrial applications. The many substantial construction features of this extensive line of plugs and receptacles and the high quality of materials and workmanship insure safe operation, uninterrupted service and long life.



QuelArc* • ***Circuit Breaking Series*** **Unique partitioned insulation provides long insulated paths through air and across surfaces for exceptional protection in these current rupturing devices. Cast metal housings, high grade insulation and individually renewable contacts insure long service life. Ratings 20, 30, 60, 100 and 200 amperes, 250 volts DC, 600 volts AC—2, 3, and 4 pole—grounded through shell or extra pole. Threaded cap, plain and hinged spring door housing styles are available.**

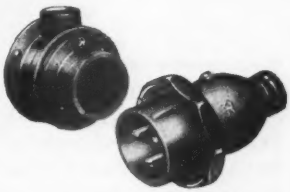


Interchangeable reversible contact units. 1, 2, 3, 4, 6, 8 pole

Triploc* ***and Multiple-Circuit Series***

A line of exceptional versatility, unequalled in the heavy duty field, with a virtually unlimited number of assembly combinations for varied applications. Offers a selection of 1, 2, 3, 4, 6 and 8 pole contact units which are interchangeable and reversible in any single set of housings. Many types of housings available of pressed steel with automatic lock and of cast metal threaded for watertight gasket seal. Multi-Circuit housings with 2, 3 and 4 contact units available for combinations up to 32 poles. Ratings 15 and 20 amperes, 250 volts DC, 460 volts AC —circuit breaking. Pressed steel fusible and fuseless plugs measure only 1 13/16" outside diameter.

Midget Triploc* ***Series*** **Same construction features as Triploc except for much smaller outside diameter of plug shell—only 1¼". Interchangeable and reversible contact units—2, 3 and 4 pole—are of the flat blade type. Rated 10 amperes, 250 volts; 15 amperes, 125 volts.**



General Purpose ***Series*** **Available with cast metal housings in many types for circuit breaking and disconnect service. 30 amperes, 125 volts DC, 250 volt AC—1, 2, 3, 4, 5 and 6 pole. 60 amperes, 250 and 600 volts—3, 4 and 5 pole. 100 ampere, 250 and 600 volts—2, 3 and 4 pole. Also many special types, fusible and fuseless, for varied applications.**

*TRADEMARK REG. U. S. PAT. OFF.

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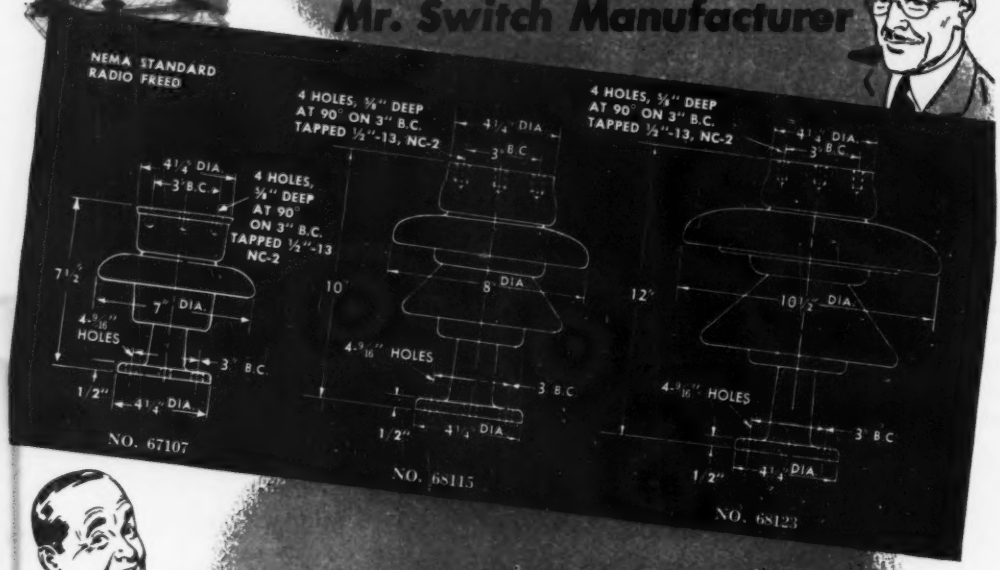
P. P. INC. No. 69134 STACKS
ON 115 KV SERVICE

Mr. Station Designer

Mr. Switch Manufacturer



We'd Go Out of Business

if we depended on your replacing these rugged insulators!

Because—we build your Switch and Bus Insulators to last forever. We don't expect replacement business but look for your new business.

Finest Wet-process Porcelain—quality controlled, standard designs, expertly assembled, assure long life.

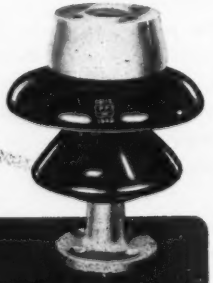
Dimensionally Standard Hardware Components—assure interchangeability—double hot-dip galvanized means low maintenance cost for you—precision jig assembled saves mounting time.

Rugged Designs—to give ample factors of safety over standard characteristics.

Exhaustive Routine Tests—Each shell and every insulator is tested in excess of AIEE-NEMA standards—your safety assured.

Availability—most sizes currently in stock.

PP INC.



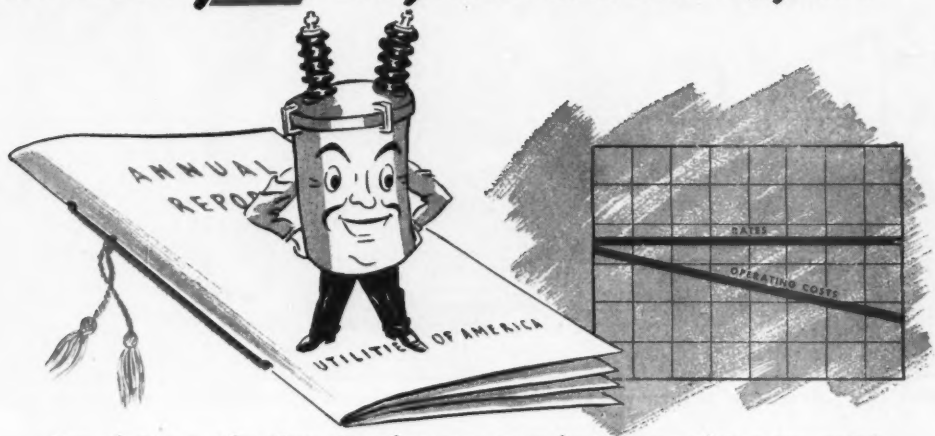
YOUR INDEPENDENT INSULATOR MANUFACTURER

Porcelain Products, Inc.

PARKERSBURG, WEST VIRGINIA

MOLONEY *HiperCore* TRANSFORMERS

will look good on your Annual Report!



Yes, that's so. HiperCore Transformers can reduce your maintenance costs!

For instance

1. Peak overloads which produce high winding temperatures and greatly shorten the life of ordinary transformers are readily handled by HiperCore Transformers without damage. This is a direct result of the wound core design which permits a smaller core and coil mass, and therefore a lower temperature gradient.

2. Short circuits which cause shifting and distortion of transformer windings seriously damage winding insulation. HiperCore coils are securely braced and made mechanically rigid with heat-curing bonding materials to withstand short circuit conditions which would send most transformers to the repair shop.

3. Poor voltage regulation during short-time overload periods results from high transformer impedance. Low impedance has been achieved on HiperCore Transformers by means of the small core size and the resulting shorter coil winding. This means that HiperCore Transformers can often deliver the load with satisfactory voltage regulation where an ordinary transformer of the same Kva size might give such poor regulation as to require its removal and a larger size installed.

MB91-16

You can have

Conventional Type LL HiperCore Transformers equipped with side-wall-mounted high and low voltage bushings in all standard voltages below 5,000 volts.

Conventional Type CL-1 HiperCore Transformers equipped with one cover mounted high voltage bushing for use on grounded neutral systems.

Conventional Type CL-2 HiperCore Transformers with two cover mounted bushings in standard sizes for use on either Delta or Wye systems, in single or three-phase banks.

Or HiperCore CSP Transformers in identical ratings but fully equipped with self-protecting equipment with no additional protective equipment needed.

MOLONEY ELECTRIC COMPANY

Manufacturers of Power Transformers • Distribution Transformers • Load Ratio Control Transformers • Step Voltage Regulators • Unit Substations

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DAILY LOAD CURVES CAN BE IMPROVED CONSIDERABLY WITH INSTALLATION OF INEXPENSIVE TGW-2 TIME SWITCHES.

NEW LOW-PRICED OFF-PEAK CONTROL ANNOUNCED BY GENERAL ELECTRIC

TGW-2 is most modern time switch for water heater control

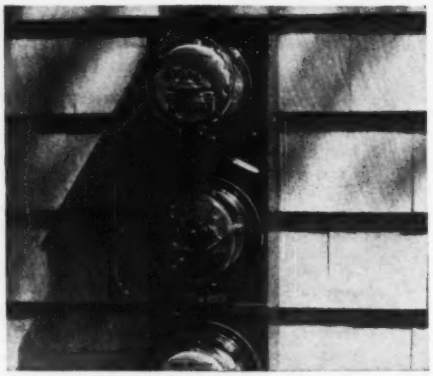
With increasing demand for power today, off-peak control of water heaters is becoming more and more necessary. The new and improved General Electric TGW-2 time switch cuts down your peak demands by providing you with inexpensive, efficient control of water heater loads.

Combining low first cost with low installation cost, the new TGW-2 operates with minimum maintenance. Important design improvements have added to attractive appearance and simplified the time setting operation.

Reliable mechanism is powered by the time-proved Telechron* motor. The Type TGW-2 is available with single or double pole operations and with riders or cut dial for on-off operations.

For approaching seasonal peak loads, make certain your installed capacity is being utilized to best advantage. Contact your local G-E apparatus office for more information on how the TGW-2 can improve your load curve and build big savings. For further details on the time switch, write for Bulletin GEC-705, Section 603-126, General Electric, Schenectady 5, New York.

*Registered Trademark of General Electric Co.



ATTRACTIVE APPEARANCE of TGW-2 is important customer feature—uses same base and cover as I-50 watthour meter.

TIME SETTING OPERATION is simplified in TGW-2 without removing cover by convenient easy-to-use sealable openings.

GENERAL ELECTRIC

603-126

for easier and better work...keep all three tapes on hand

it takes

NOT ONE...NOT TWO ...but ALL THREE ELECTRICAL TAPES

to meet electrical insulating requirements

the "Dutch Brand" trio

● No one tape can do all jobs—it takes the *correct* tape or the right *combination* of tapes, depending upon specifications and requirements.

DUTCH BRAND insulating tapes are made by specialists in electrical tape manufacturing, experienced through years of close association with the electrical industry. These men have a full understanding of electrical insulating problems. It is this experienced background that has produced these high quality DUTCH BRAND electrical tapes, so well known for over forty years.

That's why we repeat, it takes NOT ONE ... NOT TWO ... but ALL THREE electrical tapes to meet requirements.

ORDER ALL THREE FROM YOUR JOBBER

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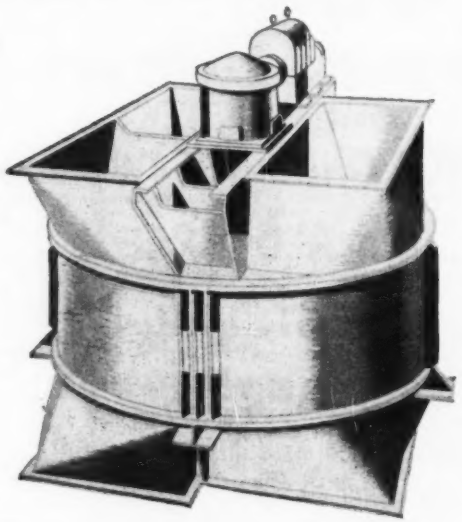
GET ALL 3 with the LJUNGSTROM AIR PREHEATER

- **Improved Combustion**
- **Better Heat Recovery**
- **Plant Material Savings**

The Ljungstrom operates on the continuous regenerative counterflow principle. The heat transfer surfaces in the rotor act as heat accumulators. As the rotor revolves the heat is transferred from the waste gases to the incoming cold air.

If you want to improve the combustion of low-grade fuels . . . raise the level of heat recovery . . . conserve critical materials in plant design . . . you or your consultants can make profitable use of Preheater experience. Let our specialists tell you more about the Ljungstrom Air Preheater, and the outstanding job it has done for hundreds of America's leading industries and public utilities, where the need for preheated air from 300F to approximately 1200F was part of their problem. Our engineers are ready to work with you in applying the Ljungstrom to your own heat recovery problem.



THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

PAPER INSULATED CABLE

For outstanding, uninterrupted, dependable service . . . ROEBLING!

EXPERIENCE SHOWS you'll get maximum economy by putting circuits underground with Roebling Paper Insulated Lead Encased Cables. This immediately does away with the expensive maintenance of overhead lines. And Roebling cables . . . entirely produced in Roebling plants to the most exacting specifications... are your assurance of unsurpassed performance and low-cost service.

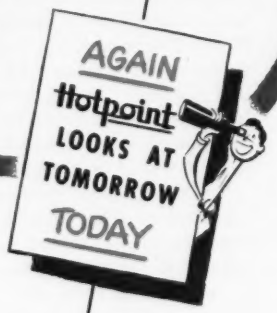
Roebling Shielded Type H is a foremost selection for 3-phase grounded neutral circuits from 13 to 33 kv. It is made in single and multiple conductor construction, in regular and Compack strand (round or sector). Where the cable will be exposed to electrolysis or corrosion, the conventional lead sheathing can be given an outer non-metallic protective jacket of ROESHEATH.

Large quantities of Roebling's complete electrical wire and cable line are required in the national rearmament program. The Roebling organization and distributors will, however, do everything possible to meet your delivery requirements. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

Atlanta, 934 Avon Ave ★ ***Boston,*** 51 Sleeper St ★ ***Chicago,*** 5525 W. Roosevelt Rd ★ ***Cincinnati,*** 3253 Fredonia Ave ★ ***Cleveland,*** 701 St. Clair Ave, N.E. ★ ***Denver,*** 4801 Jackson St ★ ***Detroit,*** 915 Fisher Building ★ ***Houston,*** 6216 Navigation Blvd ★ ***Los Angeles,*** 216 S. Alameda St ★ ***New York,*** 19 Rector St ★ ***Odessa, Texas,*** 1920 E. 2nd St ★ ***Philadelphia,*** 230 Vine St ★ ***San Francisco,*** 1740 17th St ★ ***Seattle,*** 900 1st Ave, S. ★ ***Tulsa,*** 321 N. Cheyenne St ★ Export Sales Office, ***Trenton, N. J.***

Utility Executives Endorse Hotpoint's Plan of Action During a Guns and Butter Economy



Geared to the problem of Load-Building and Load-Balancing, Hotpoint's timely program, prepared in chart form, is ready for presentation to utility management.

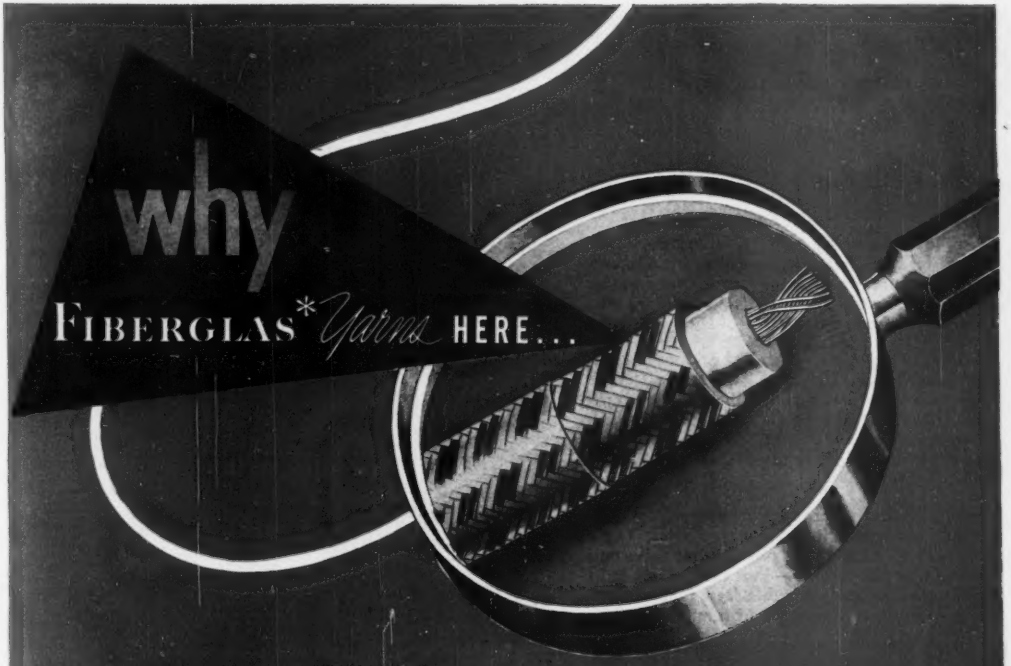
Operating under a dual economy has presented problems to many businesses, including utilities, which call for a re-appraisal of what we've been doing and a new look at what needs to be done now. In the light of present complex conditions, Hotpoint has prepared a suggested long-range utility promotion program timed for introduction during the period of Defense Mobilization. Those utility executives who have reviewed this program, and the supporting material available for your use, have praised the sound planning that has gone into it. We shall be happy to present it to your organization.

UTILITY DIVISION

Hotpoint Inc.

(A General Electric Affiliate)

5600 West Taylor Street, Chicago 44, Illinois



why FIBERGLAS* Yarns HERE...

IN LACQUERED WIRE AND CABLE

Because

—Fiberglas yarn braid won't burn, resists soldering heat

—Fiberglas yarns are tough even in small diameters . . . that means thinner, easier to handle wire

—Fiberglas yarns won't rot . . . even in tropical climates

—Competitive in price with conventional lacquered wire

Specify Fiberglas yarn braid when you order lacquered wire or cable.

Send for your FREE copy of the booklet, "Specify Fiberglas Yarns in Wire or Cable," today.

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Electrical Sales Division, Dept. 858
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FIBERGLAS IS IN YOUR LIFE . . . FOR GOOD!

Please send me the booklet "Specify Fiberglas Yarns in Wire or Cable."

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City:.....*Zone*.....*State*.....

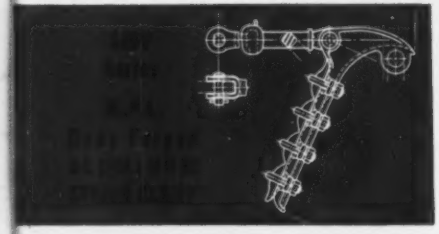
Life-line

from America's mightiest falls

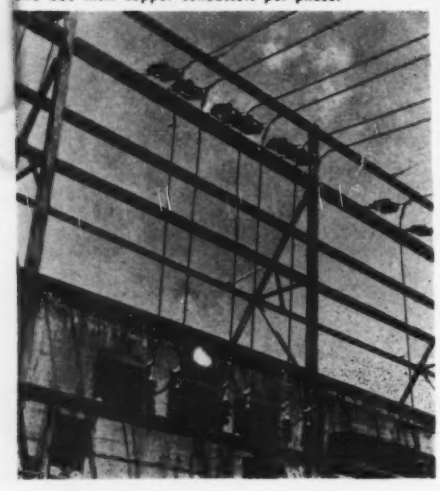
Power generated by mighty Niagara Falls is carried for 3 miles over these Niagara Mohawk Power Corporation lines — from the company's hydroelectric station at the falls to a nearby switching station.

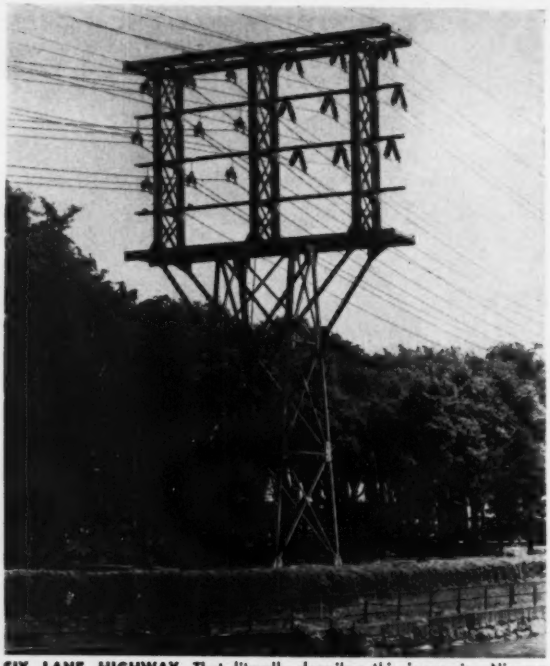
The lines, which serve chemical and metallurgical industries in the area, were constructed prior to 1925. Because of the high currents transmitted and the corrosive atmosphere encountered, they were reinsulated in 1950 with fog type insulators and BTC Drop Forged Bronze Clamps.

Select BTC Drop Forged Clamps and Fittings for all your transmission line projects. You'll find — as so many major power companies and construction firms have — that they're easier to install, give efficient trouble-free performance and help keep maintenance at a minimum.

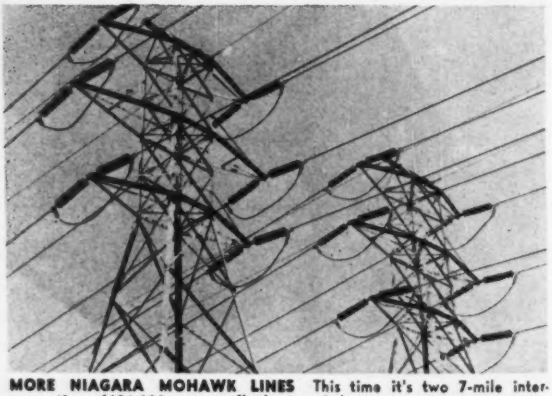


SPEAKING OF CONNECTIONS Here's a view of generator connections at Niagara Mohawk's hydroelectric station. Power is transmitted over 12 kv lines having two 500 mcm copper conductors per phase.





SIX LANE HIGHWAY That literally describes this impressive Niagara Mohawk structure! It carries three 12 kv lines (1,000 mcm copper) and three 69 kv lines (500 mcm copper).



MORE NIAGARA MOHAWK LINES This time it's two 7-mile interconnections (636,000 cm — all aluminum) between a steam generating plant at Dunkirk, N. Y. and the company's 115 kv bulk power system. Note the continuous span-jumper construction and absence of jumper splicing. The design of the BTC Drop Forged Aluminum Strain Clamps used on these lines makes it easy to string through the clamps without cutting the conductor — good insurance against jumper splice trouble.

Sold Through Your Insulator Manufacturer Only

Drop Forged BTC Hi-Line Hardware

The BREWER-TITCHENER Corporation

Cortland • New York

Above: Wireless telegraphy apparatus employed by Guglielmo Marconi in 1899. Right: 150-ft aerial mast at his Boulogne, France, experimental station.

Rendezvous With MASTERY

1899—and a young man, near Boulogne, France, presses the key of a transmitter. Instantly, his message clicks out on a receiver in Dover, England—32 miles distant. The way has been opened to mastery of instantaneous, world-wide communication.

1899—and a Board of Directors of an infant firm, convening for its initial meeting in Newark, N. J., hears the Treasurer state that $1,400 is at the disposal of Driver-Harris Company with which to commence business. The way has been opened to mastery of new facts and techniques which will provide industry with quality metal products never before available.

"Wireless" has been developed with phenomenal speed since the day Marconi's message was successfully transmitted from Boulogne. Within fifty years—as radio, television, and radar—it has been made to circle and serve the world.

And Driver-Harris, expanding within the same fifty years until represented on all five continents, has produced many of the alloys required. For example: Gridnic* for electron tube grid wire, alloys for radio cathode sleeves and glass seal metals, Karma* and D-H Manganin for resistors, and universally famous Nichrome* and Nichrome V for resistors, plates and other components.

Today, Driver-Harris' specialized knowledge and extensive facilities are employed in supplying superior alloys for a host of applications in numerous fields. The name "Driver-Harris", indeed, has become so widely accepted as a synonym for quality that the demand for D-H products is engaging the resources of the firm to an unprecedented extent. Driver-Harris can only say it is utilizing all the mastery at its command to meet this exceptional demand as fully as possible.

Makers of Nichrome and over 80 other alloys for the electrical, electronic, and heat-treating fields.

Driver-Harris Company

HARRISON, NEW JERSEY

BRANCHES: Chicago, Detroit, Cleveland, Los Angeles, San Francisco

In Canada: The B. GREENING WIRE COMPANY, LTD., Hamilton, Ontario, Canada

*T.M. REG. U. S. PAT. OFF.

A ONE MAN "FIRE ENGINE"

—the Kidde Dry Chemical Wheeled Extinguisher

You *can* control a roaring fire in flammable liquids, transformers, circuit breakers, bus bays or vaults. The Kidde 150 Pound Dry Chemical Wheeled Extinguisher packs a fire-fighting wallop that brings large fires under control quickly and easily.

The new "instant flow" hand control enables you to beat back fire with a long range "straight" stream... or to blanket the fire completely by the wider coverage which you get from the improved "fan" pattern.

One man can wheel this extinguisher through a standard doorway... apply 150 pounds of fire-smothering dry chemical in less than one minute.

Write for complete information on this new Kidde Dry Chemical Wheeled Extinguisher... or the full line of Kidde fire extinguishers and built-in systems.

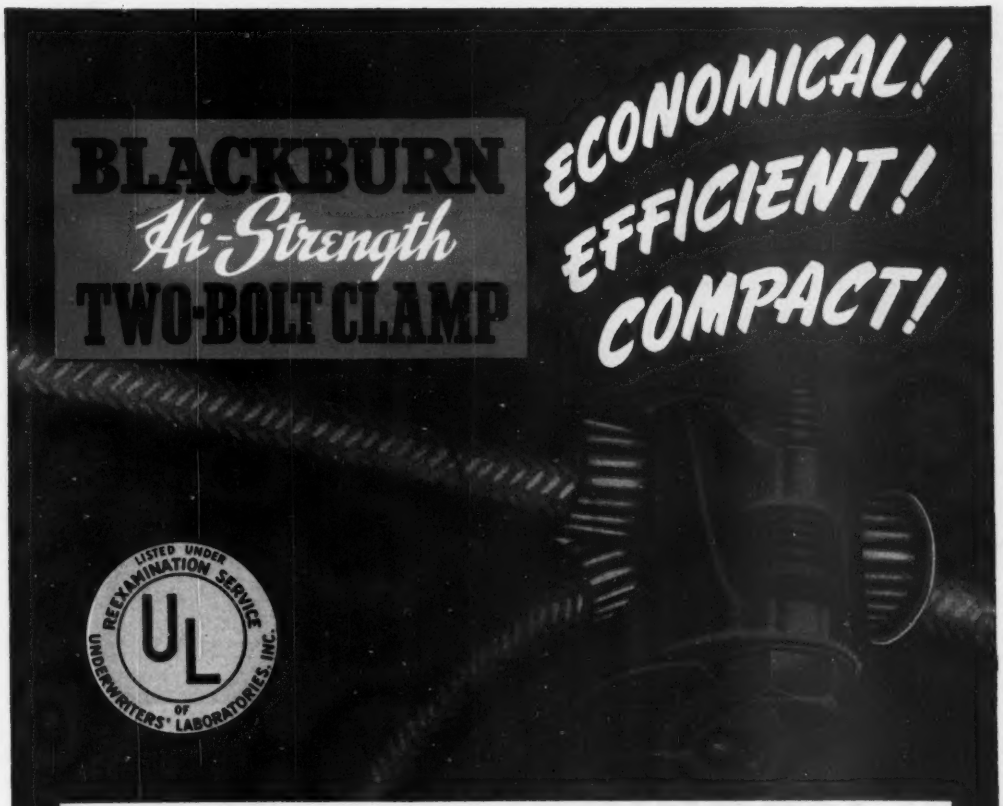
Kidde

Walter Kidde & Company, Inc., 830 Main Street, Belleville 9, New Jersey

Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

BLACKBURN *Hi-Strength* TWO-BOLT CLAMP

ECONOMICAL! EFFICIENT! COMPACT!



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A BETTER CABLE CONNECTOR AT LESS COST!

- Especially designed for medium and large stranded wire and cable.
- Produces very high clamping pressure resulting in low resistance joints on stranded wire.
- It costs much less than other types of connectors commonly used.
- It is excellent for dead ends, taps, and service entrance connections and will accommodate a range of wire sizes.
- Exclusive helical serrations in both body and cap, conforming to the lay of stranded wire, together with the high clamping pressure produce a joint which will not pull apart. Thus the Blackburn Two-Bolt CLAMP is excellent for dead ending.
- It's made of high strength alloys throughout. Its extra strength maintains the high "pressure between wires" indefinitely. Thus it makes a lasting, trouble-free connection.
- It's compact and easy to tape — makes a neat joint.
- It's simple and easy to install.
- Made in sizes 1/0 to 1000 MCM.

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Mail Coupon for Sample and Full Details

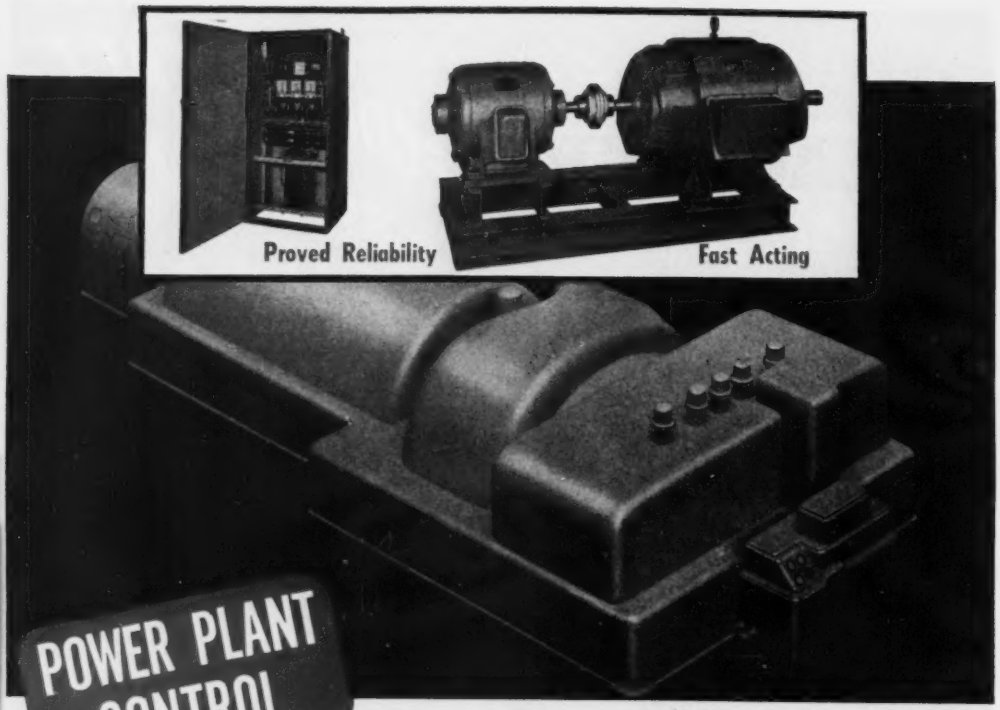
Send me sample and further information on the BLACKBURN TWO-BOLT CLAMP.

Wire Size Used_____

Your Name_____

Company_____

City & State_____



POWER PLANT CONTROL *Regulex* Rotating Voltage Regulators!

FOR FAST, ACCURATE, reliable control of large generators, select *Regulex* voltage regulators. The regulator's output, connected in series with the self-excited main exciter shunt field, aids or bucks excitation . . . maintains accurate line voltage.

IMPROVES SYSTEM STABILITY

You get both regulation and maximum stability from old or new generating equipment by using the *Regulex* rotating regulator. During transient loads, high amplification and fast response force the generator field current to reach the required value for stability quickly — quickly enough to keep the machine in synchronism through most faults. Its quick voltage recovery and limited overswing further aid generator stability.

AND RELIABILITY

The *Regulex* voltage regulator consists of two parts: 1) the control cubicle which contains only static devices and requires no maintenance; 2) the *Regulex* rotating amplifier which is essentially a dc generator and requires no more maintenance than a normal exciter. No special training of maintenance personnel is required.

Call your nearby A-C representative for more information, or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Regulex is an Allis-Chalmers trademark.

ALLIS-CHALMERS A-C A-3458

Order Telegraph Systems

The Allis-Chalmers Order Telegraph System is accurate and reliable . . . can be depended upon even during station power failure because it uses the dc bus for its power source. An alarm system operates until the order is returned correctly. Five or ten inch semi-flush dials for switchboard mounting. Use it to transmit orders between switchboard and turbine room.

Automatic Speed Control for Boiler Draft Fans

Draft fans operate at exactly the required speed for perfect combustion when Allis-Chalmers Type 257 Liquid Rheostats are used with wound rotor drive motors. They are application engineered to provide straight line speed characteristics . . . automatic wide range stepless speed control. Use electric, pneumatic or hydraulic pilot devices. Ask for leaflet 14S7544.

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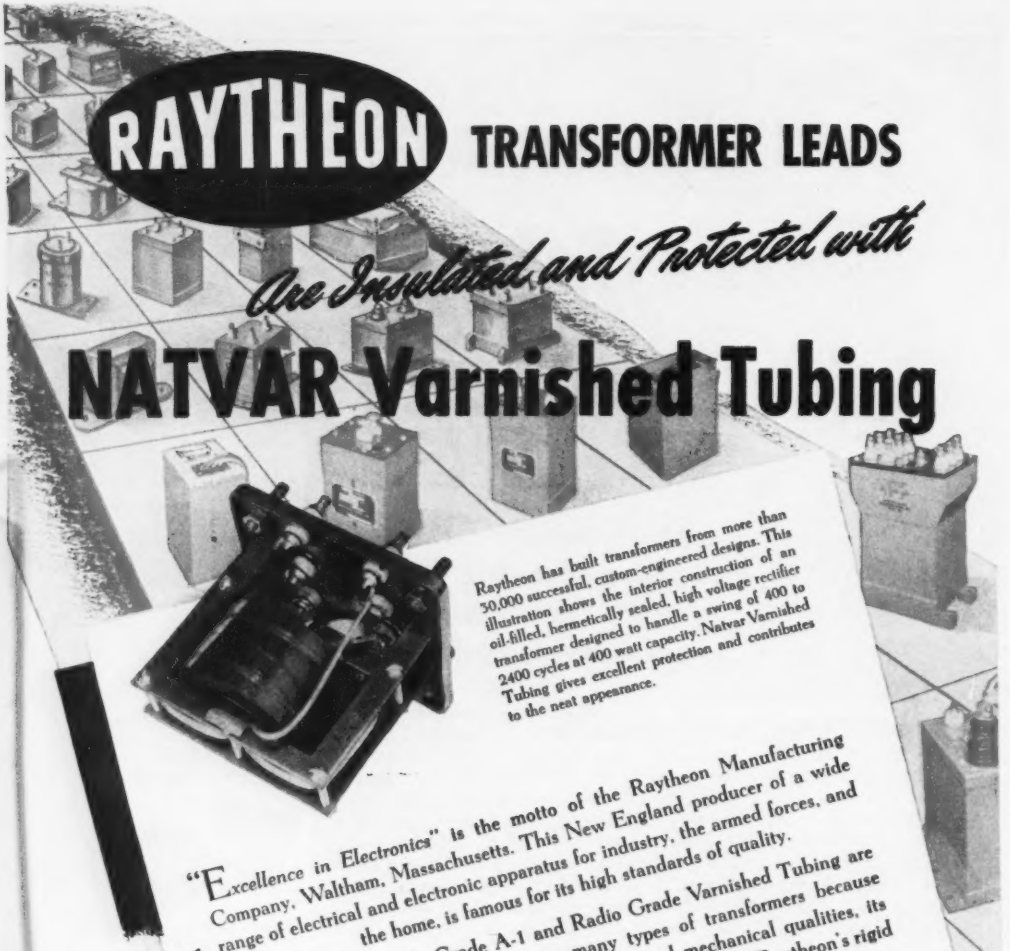

Raytheon has built transformers from more than 30,000 successful, custom-engineered designs. This illustration shows the interior construction of an oil-filled, hermetically sealed, high voltage rectifier transformer designed to handle a swing of 400 to 2400 cycles at 400 watt capacity. Natvar Varnished Tubing gives excellent protection and contributes to the neat appearance.

"Excellence in Electronics" is the motto of the Raytheon Manufacturing Company, Waltham, Massachusetts. This New England producer of a wide range of electrical and electronic apparatus for industry, the armed forces, and the home, is famous for its high standards of quality.

Natvar Grade A-1 and Radio Grade Varnished Tubing are used by Raytheon on many types of transformers because of Natvar's excellent electrical and mechanical qualities, its uniformity at all times, and its ability to meet Raytheon's rigid material specifications.

Natvar Varnished Tubing and other Natvar flexible insulations are available from conveniently located wholesalers' stocks or direct from our own.

Natvar

Natvar Products

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JAMESTOWN, N. Y.

WRENCHES . . . . . and how to use them

A prime rule in using any adjustable wrench is to first adjust it to a snug fit on the nut to be turned. (Fig. 7.) A tightly adjusted wrench is safer since danger of slippage is minimized. A loosely fitted wrench will tend to "round" the corners of hexagonal objects, and may damage the wrench by exerting undue strains on the jaws. Greasy, oil-covered tools are dangerous. Keep handles clean and dry by occasional wiping. Oil should be applied sparingly to moving parts.

Fig. 7

Adjustable Wrenches develop their greatest strength when hand pressure is applied to the side of the wrench carrying the fixed jaw as in Fig. 8. They can, however, be pulled in either direction on moderate loads, and are frequently "flopped" between

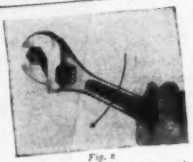

Fig. 8

swings to gain an angular advantage and permit continuous rotation of nuts or bolts where cramped quarters limit the handle swing.

"Crestoloy" Wrenches, being thinner (and stronger) than "Crescent" Wrenches, are the preferred tools for use in cramped quarters or when adjustable wrenches are used in pairs as in Fig. 9. For extremely heavy loads, Crestoloys are likewise recommended. (See tools illustrated page 15.)

Fig. 9

4

PLIERS . . . . . and how to use them

Slip Joint Pliers

Crescent Slip Joint Pliers are a general purpose tool having excellent gripping power over a wide capacity range because of their adjustable jaws. Ideal for holding or turning round pieces. Should not be used on nuts or bolt heads. (See tools illustrated page 15.)

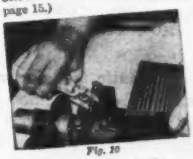

Fig. 10

Skinning Insulated Wire

Fig. 12 illustrates the proper way to grasp a light, diagonal plier. The third and little finger "inside" the handles provide pressure to hold the jaws apart. Pressure of the thumb stabilizes the tool and maintains desired jaw opening.

To skin wire, grasp it as shown with the left hand, as in Fig. 11. Now with plier held, as shown, close the jaws sufficiently to cut through the insulation *only*. Don't cut through the conductor!

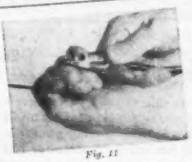

Fig. 11

Now "rock" plier handles toward left wrist and the prying action will strip the insulation from the wire end.

"Cleaning" or brightening of the bare wire is shown in Fig. 12. Close jaws just enough to provide slight pressure and draw cutter blades along the bare wire a few times. Rotate wire with left hand so that the entire circumference is clean. (See tools illustrated page 17.)

Fig. 12

5

"Crescent" is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by Crescent Tool Company, Jamestown, N. Y.

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Give Wings to Work
Sign of the Artisan
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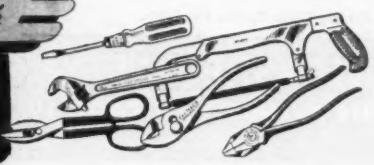

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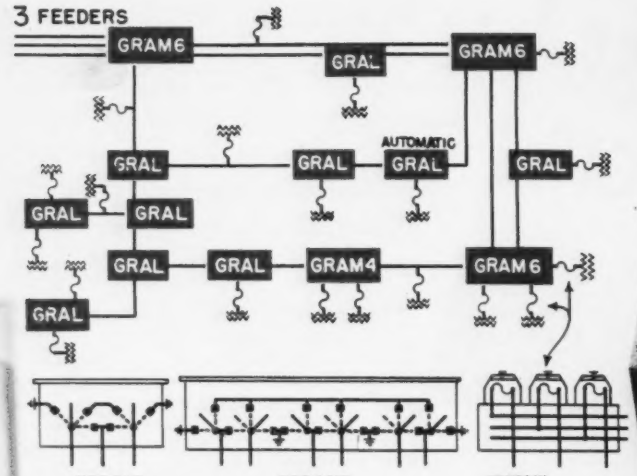

"GRAL" Load Break Oil Switch

Load fed from either side—or feeder looped through with or without load connected with ground position for each feeder.

"GRAM" Load Break Oil Switch

Three feeders looped through or interconnected in any arrangement. 6 way with continuous bus and ground position for each set of links.

"FCBX" Fuse-Switch Box

Fuse protection for individual loads with convenient load break oil switching—used separately or attached to "GRAL" switches.

G & W load break oil switches, automatic transfer mechanisms, fuse-switch boxes, and splice boxes have been specified throughout this complete primary distribution system at a large state institution. Equipment cost was held to a minimum with no sacrifice in efficiency by the use of G & W sectionalizing equipment.

Transformers in 20 load areas are supplied by a network operating at 4160 volts delta. Type "RA" load break oil switches permit isolation of any area and rapid interconnection of loop feeders in case of failure at any point in the system. Any one of the 20 load areas can be isolated without interrupting service to the other sections of the system—and all areas can be supplied while only one of the incoming feeders remains energized. An automatic transfer mechanism is used at the main building vault to assure rapid connection to an alternate feeder if the normal source fails.

Individual loads are supplied through Type "FCBX" fuse-switch boxes which provide a convenient means of disconnection under load in addition to short circuit protection.

Let G & W engineers or engineering representatives show you how G & W equipment will help solve your distribution problems.

Write for Bulletin H49, a discussion of Primary Cable System Flexibility.

Use G & W Cable Accessories for
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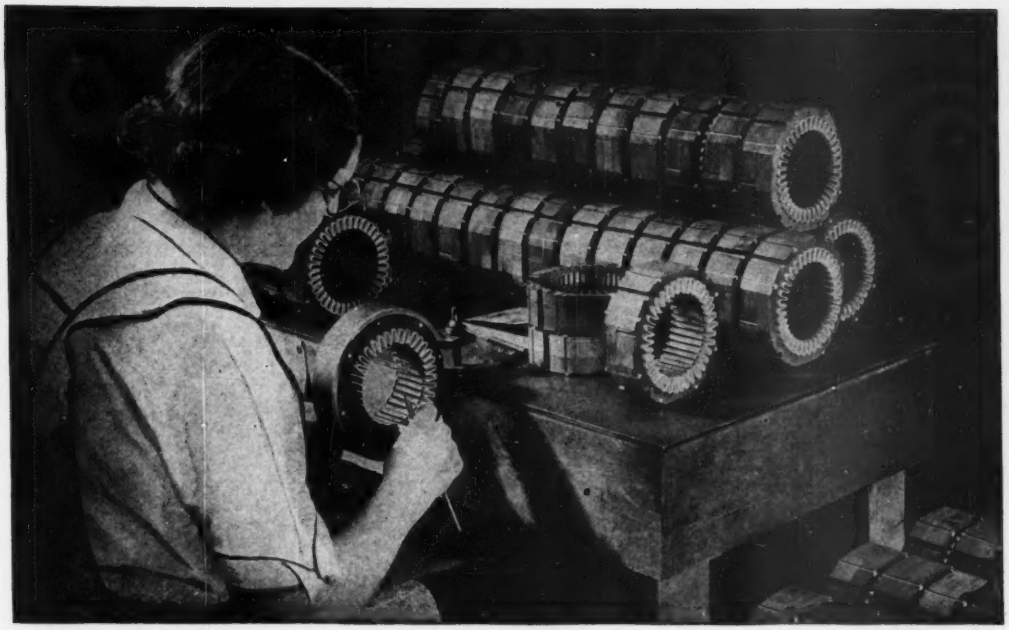

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The Kingston-Conley Division of the Hoover Company uses Irvington IRV-O-SLOT insulation on its famous line of electric motors. Mr. A. E. Ott, Sales Engineer at Hoover, tells why:

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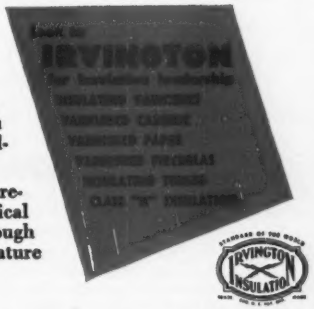
These are among the reasons why IRV-O-SLOT has been the choice of many an electrical manufacturer, ever since Irvington introduced it as one of the *first* combined varnished-cambric-and-backing slot insulations.

The IRV-O-SLOT line now includes insulation for every slot requirement. Backing papers combine high dielectric and mechanical strength with ease of forming. Bonding adhesive allows enough "give" to prevent rupture of varnish film. IRV-O-SLOT literature is yours for the asking—just use the coupon below.



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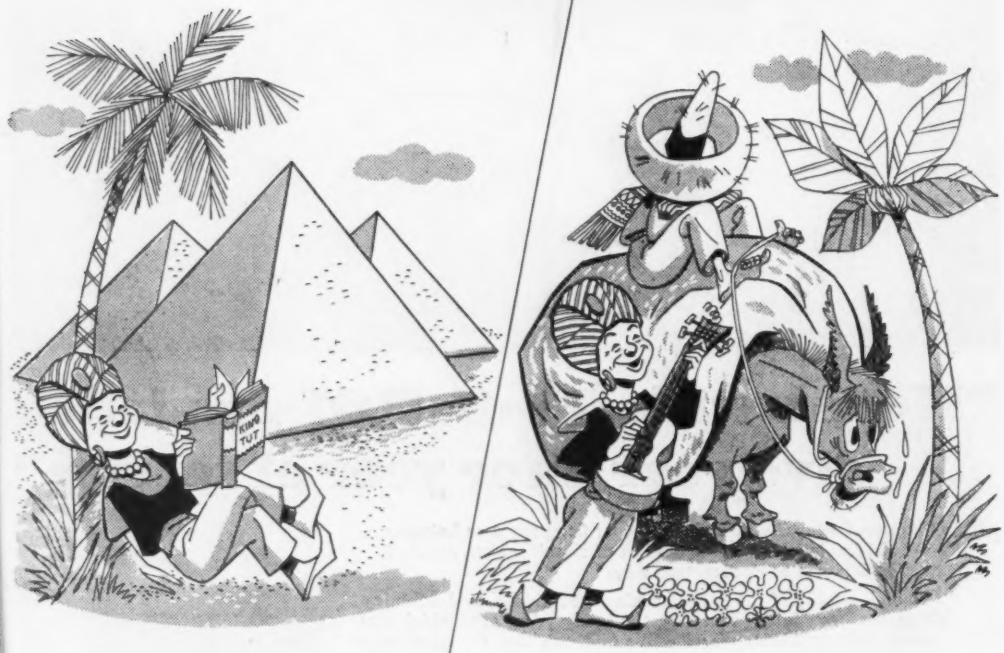

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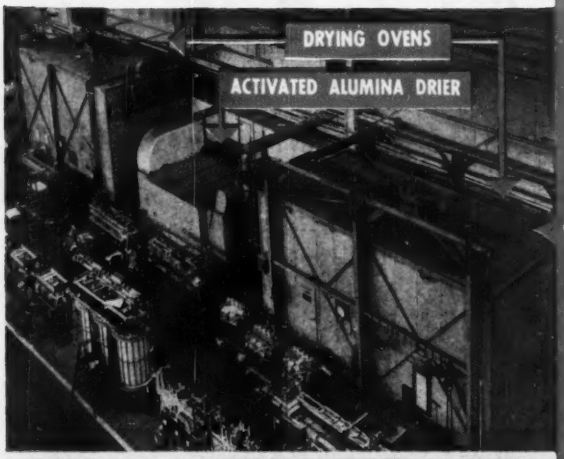
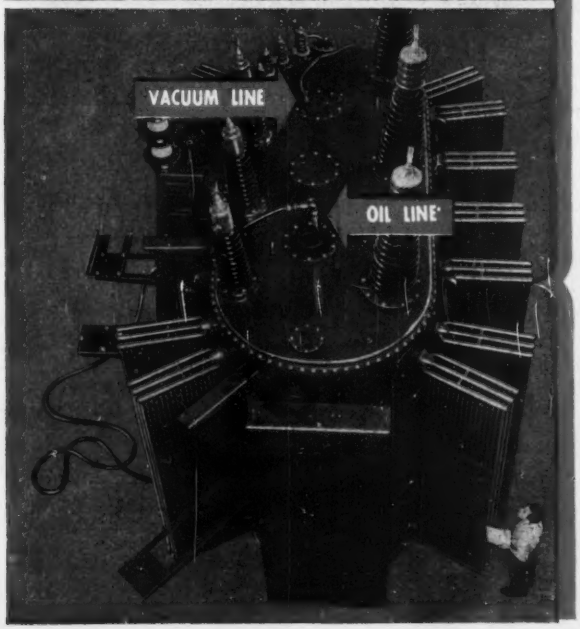
A recent check of approximately 300 Pennsylvania Power Transformers indicated that the power factor values for these transformers were under 2%, with many under 1%. This fine record is due in part to Pennsylvania's excellent procedures for:

- **Drying out transformer core and coil units**
- **Filling transformer with oil**

These factory procedures, maintained under careful control at all times, are part of Pennsylvania's over-all program to provide America's Utilities and Industrials with the best power transformers that can be made.





Drying of Transformers

Pennsylvania's low-temperature, low-humidity drying equipment consists of two specially designed ovens and an elaborate activated alumina air-drying system.

Integral parts of this equipment are: (1) an air recirculation system with a capacity of 12,000 cubic feet per minute, and (2) a precooler that lowers the temperature of the air as it leaves the oven and removes the moisture from the air by condensation. Transformers can be dried in 24 to 48 hours at relatively low temperatures — approximately 75°C. This fast, low-temperature drying prevents deterioration of the insulation during the drying-out period, and thus greatly increases the useful life of the insulation. Proper dryness of the insulation is determined by taking power factor readings of the insulation during the actual dry-out process.

While they are still warm, transformers are removed from the ovens and placed directly into their respective cases. The core and coil units are not permitted to cool off and absorb moisture. By keeping the insulation dry, the low power factor values are maintained.

Oil Treatment of Completed Transformers

All power transformers are filled with de-aerated oil under vacuum in their own tanks.

Transformers designed for partial vacuum **are placed inside a large vacuum tank. By breaking up the oil into a fine spray as it enters the transformer tank, the air is readily removed by high vacuum.**

Transformers designed for full vacuum **are evacuated in their own tanks. Oil is brought into the transformer through spray nozzles while a high vacuum is maintained in the tank.**

Transformer being filled with oil while under vacuum.
30,000 Kva, 3 Phase, 60 Cycles, 154,000 Grd Y-115,000 Grd Y-12470Δ volts; Inert gas-oil seal system of oil preservation; tank braced for full vacuum.

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Easy to handle, BH Special Treated speeds production. Because crossing strands are permanently crimped it may be cut in short lengths without securing the ends. All corosive, volatile materials have been removed, making BH Special Treated odorless in service and unaffected by heat or age.

BH Special Treated Fiberglas Sleeving is one of a family of electrical insulations, each designed to meet particular conditions in service. Give us a few facts about your requirements—product, temperature, voltages—we will gladly furnish samples for testing purposes.

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FREE ... a booklet or a demonstration! POWER PLANT COMMUNICATION SYSTEMS is an informative booklet showing GAI-TRONICS at work under the most difficult sound conditions. Also a demonstration can be arranged for your plant. It will save you money. If you should like a demonstration ... we will bring a portable GAI-TRONICS unit to your plant and prove its worth under any noise conditions! Write today!

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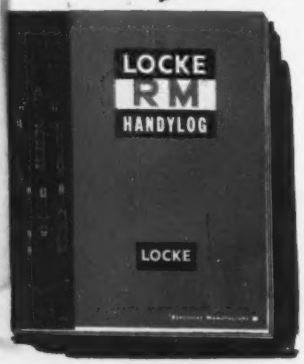

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To help offset the effect of rapidly mounting operating costs, many utilities are today concentrating on reducing their costs of inventory maintenance. In many cases, they are able to achieve a substantial cost reduction by further simplification of stocks.

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It's the perfect working partner for men wanting to further standardize and simplify their stocks of Pole Line Hardware. It lists ONLY the standard items you need. By using it, you stock fewer items, all fast movers. Each is regularly in production, and carried in stock by your Locke Regional and Distributors' Warehouse. If you haven't got a copy, write for Locke's RM Handylog today. Place the items in it on your standards list. Do this and you'll be taking the industry's only practical short-cut toward further simplification of hardware stocks. Locke Department, General Electric Company, Baltimore, Md.

*RM (Repetitive Manufacture) *A program designed to help reduce the installed cost per kilowatt on line and station equipment.*

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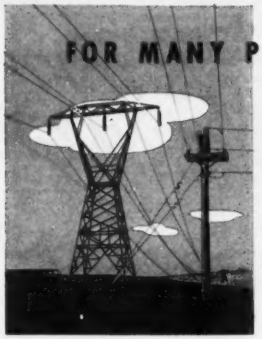

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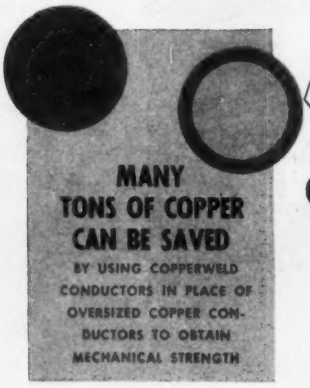
IT TAKES LESS COPPER TO DO THE JOB--

WHEN YOU USE Copperweld TRADE MARK CONDUCTORS


MANY
TONS OF COPPER
CAN BE SAVED
BY USING COPPERWELD CONDUCTORS IN PLACE OF OVERSIZED COPPER CONDUCTORS TO OBTAIN MECHANICAL STRENGTH

Copperweld* Power Conductors are known for their dependable service and low overall costs. And, they save precious copper because they use only enough of it to do the job that copper does best — conduct electricity and resist corrosion. Copperweld's tremendous strength eliminates the need for using oversized copper conductors sometimes installed to obtain necessary mechanical strength.

Because Copperweld Power Conductors are built to last, you can be sure of their efficient, trouble-free performance . . . in all kinds of weather, in every climate—year after year. You can string longer spans—save on poles, hardware and accessories—and reduce construction costs all along the line.

Power is the very heart of our industrial effort. To do this important job use Copperweld and get the best in conductors. And, by doing this, you'll save many tons of copper. Write today for the Copperweld Engineering Data Book.

*Trade Mark

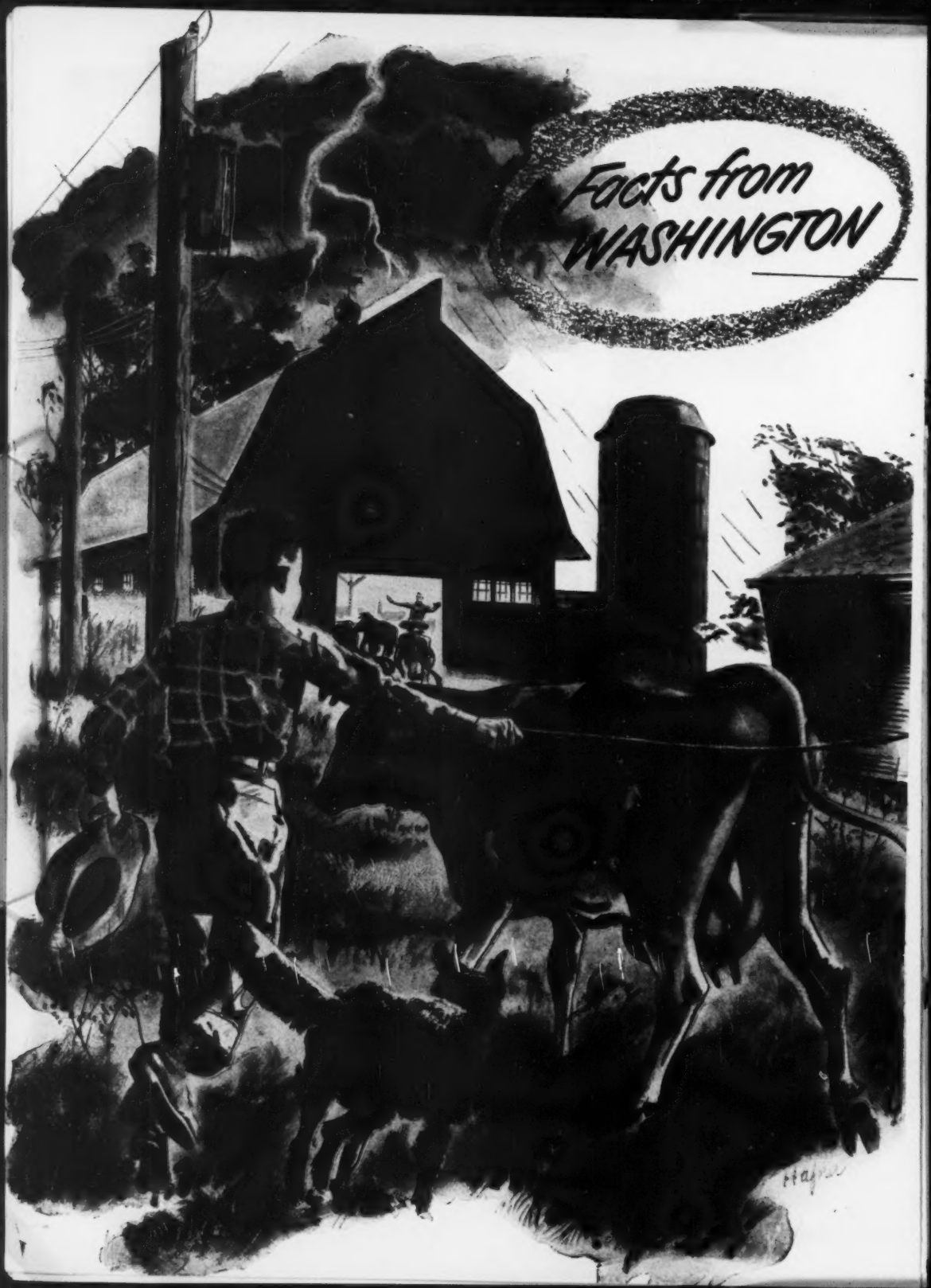
COPPERWELD SAVES COPPER

COPPERWELD STEEL COMPANY *Glassport, Pa.*

SALES OFFICES IN PRINCIPAL CITIES

Copperweld TRADE MARK DEPENDABLE POWER CONDUCTORS

MADE BY THE EXCLUSIVE COPPERWELD MOLTEN-WELDING PROCESS


Facts from
WASHINGTON

"Single 'CSP' Transformer saves us $59.20 per year"

"One 'CSP' transformer is saving us an average of eight service calls a year —at a cost of at least $7.40 per trip," reports a utility in Washington State.

"In a rather inaccessible location, we had a conventional distribution transformer at the end of a rural line. Ten years' experience indicated that it cost us an average of $59.20 per year to maintain service at this troublesome spot. In addition, each outage averaged over two hours' duration . . . a cause of considerable customer irritation.

"Three years ago we replaced it with a 'CSP' transformer. Soon afterward a severe electrical storm damaged 18 conventional transformers in the same area, but left the 'CSP' transformer untouched in the location that had been the worst offender. To date this 'CSP' transformer has not had a single 'outage'."

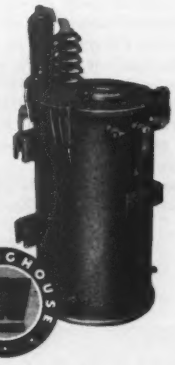
Installation and maintenance costs for Westinghouse "CSP" (Completely Self-Protecting) Transformers are always lower, because complete protective equipment is built in, not separately mounted. A two-year survey of Electric Light and Power Companies shows the following: J-70595

NATIONAL AVERAGES

	"CSP"	Conventional
Installation Costs	$13.87	$24.74
Burn-out Rate	0.257%	1.005%
Fuse Outages	None	5.64% @ $6.52 per outage
Load Checks	Automatic	12.8%
Breaker Reset	1.02%	None

If you'd like to check your own costs against these national averages, ask your Westinghouse representative for Booklet 4-247-B, "Transformer Costs and Their Relation to Profits", Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

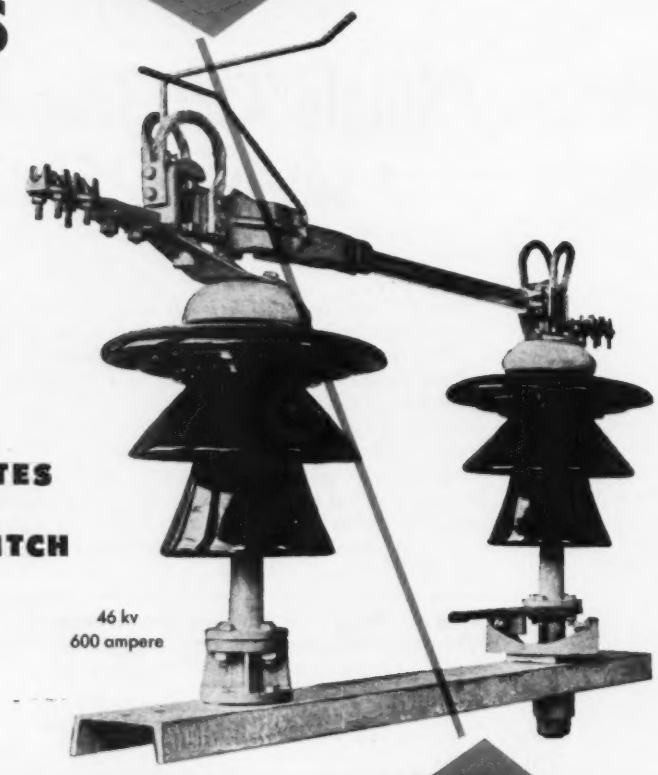
"CSP" devices . . . originated and patented by Westinghouse



YOU CAN BE SURE.. IF IT'S
Westinghouse
"CSP" DISTRIBUTION TRANSFORMERS

CONTACTS THAT NEVER GET TIRED!

HIGH PRESSURE



SOUTHERN STATES TYPE 57-HP SIDE BREAK SWITCH

46 kv
600 ampere

There are tough years ahead for the air break switch you install today; and the stiffest punishment will be heaped on the heart of the switch . . . THE CONTACTS!

That's why durability is built right into the high pressure line contacts on Southern States' Type 57-HP. They take rated fault currents, carry rated load continuously, withstand thousands of operations and still perform satisfactorily after years in the field.

The ageless quality in these contacts comes from a precompressed, stainless steel spring positioned between contact members as illustrated. Liberal contact deflection assures long life as it precludes reduction of contact pressure resulting from contact wear or maladjustment of switch controls.

The 57-HP is available from 7.5 kv to 69 kv and in current ratings of 400, 600, 1200 amperes.

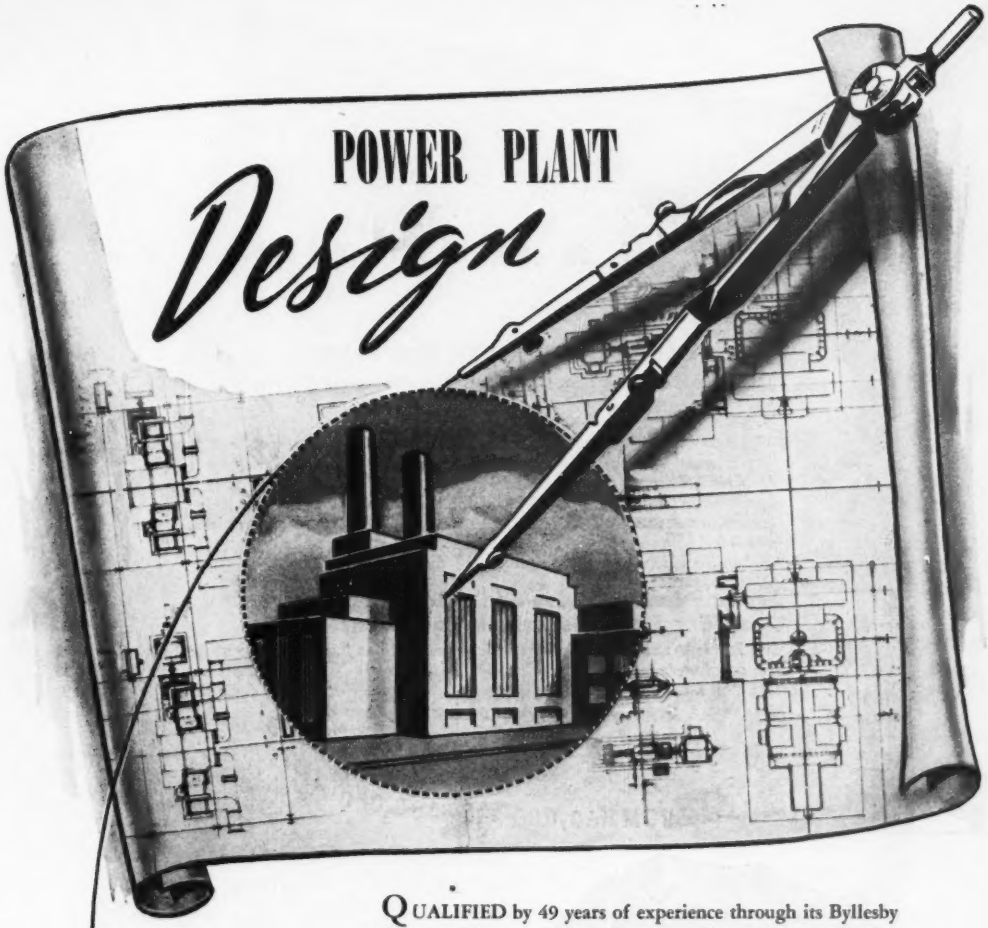
• FOR FULL INFORMATION WRITE FOR BULLETIN NO. 365-HP

POSITIVE CONTACT

CUTAWAY VIEW showing position of contact spring.

Southern States Equipment Corp.

HAMPTON GEORGIA



QUALIFIED by 49 years of experience through its Byllesby lineage, this now independent organization is contributing over 1,900,000 kw of generating capacity to the national post-war expansion program through its design and consulting engineering services with the collaboration of its purchasing engineers.

In addition, the specialized services offered by the company relieve the management of many periodic or infrequent operations and supplement its staff as to others. These services include—the development and execution of financing plans—advice on accounting and tax matters—stock transfers—dividend disbursement—depreciation and valuation studies—rate analyses and cost allocations—performance analyses—forecasts—reports.

Write for our booklet.

Pioneer Service & Engineering Co.
231 South LaSalle Street • Chicago 4, Illinois

a long way in a short time . . .

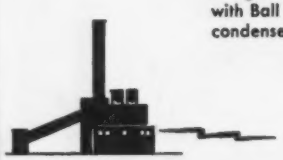
FIVE-FOLD EXPANSION IN TEN YEARS

The large up-to-the-minute steam-electric station, depicted here, again furnishes proof of management's desire to keep up with the needs of a growing economy.

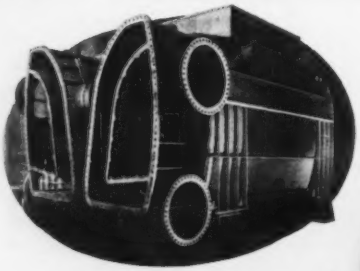
The area served by this central station consists of free-enterprising people who depend on an uninterrupted and adequate source of electric power for their growing industries. The Midwest Utility which serves this community built its first 60,000 kw unit in the area in 1942 to meet the industrial needs of World War II. Today a five-fold expansion program, which will bring the station's installed capacity up to 300,000 kw, is drawing to a close.

Foster Wheeler Steam Generators, Condensers, and Auxiliary Steam Generating Equipment

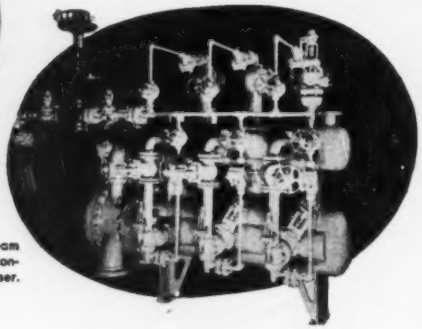
The Foster Wheeler installations which contribute so largely to the success of this great undertaking include four 640,000 lb per hr steam generators with Ball Mill Pulverizers, firing equipment, and plant equipment including condensers, steam jet air ejectors and feedwater heaters.



FROM 60,000 to 300,000 KW

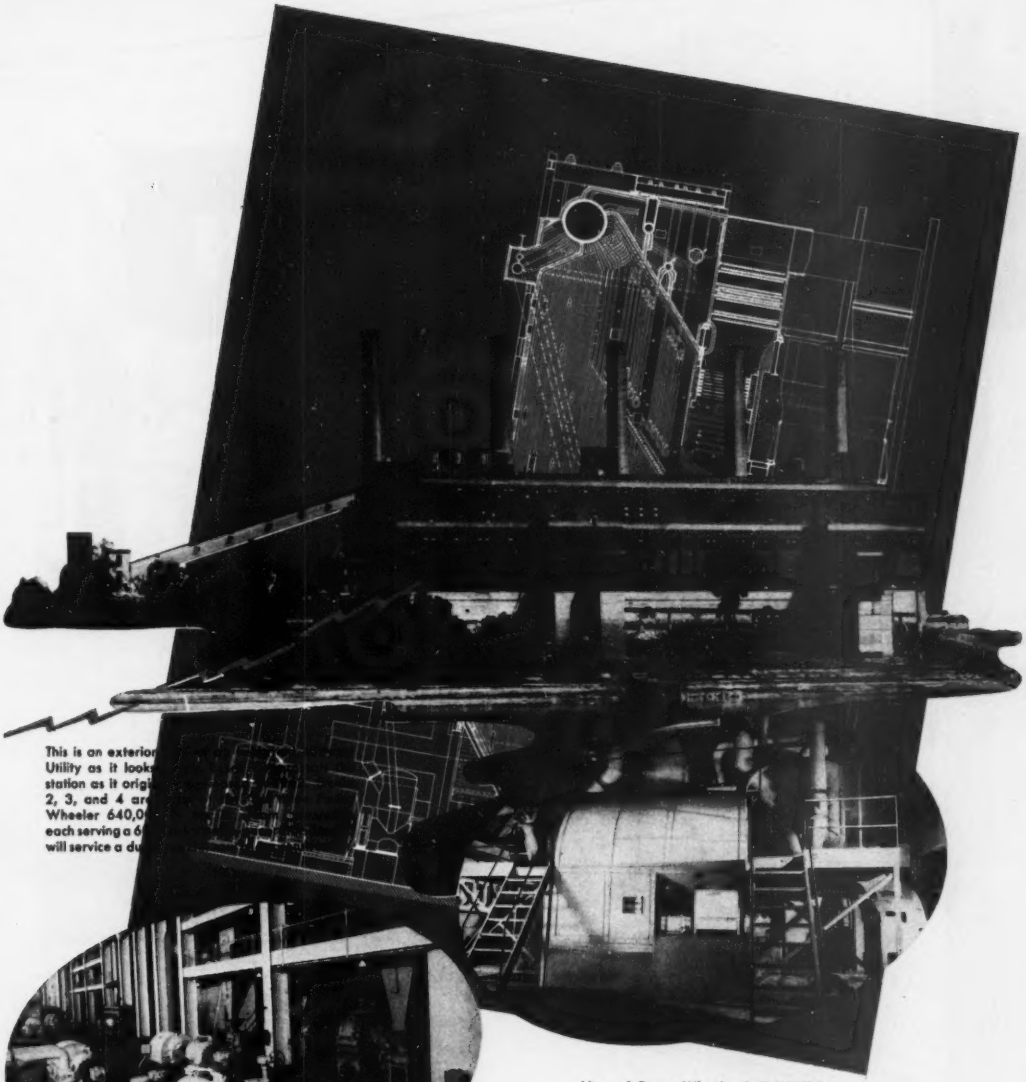


Shop photograph of one of the 55,000 sq ft Foster Wheeler surface Condensers serving the 60,000 kw turbines.



Shop view of a Foster Wheeler steam jet air ejector which removes non-condensible gases from the condenser.

FOSTER WHEELER



This is an exterior
Utility as it look
station as it origi
2, 3, and 4 ar
Wheeler 640,0
each serving a 6
will service a du

View of Foster Wheeler Ball Mill Pulverizer, one of twelve which will be in service when the station is completed.

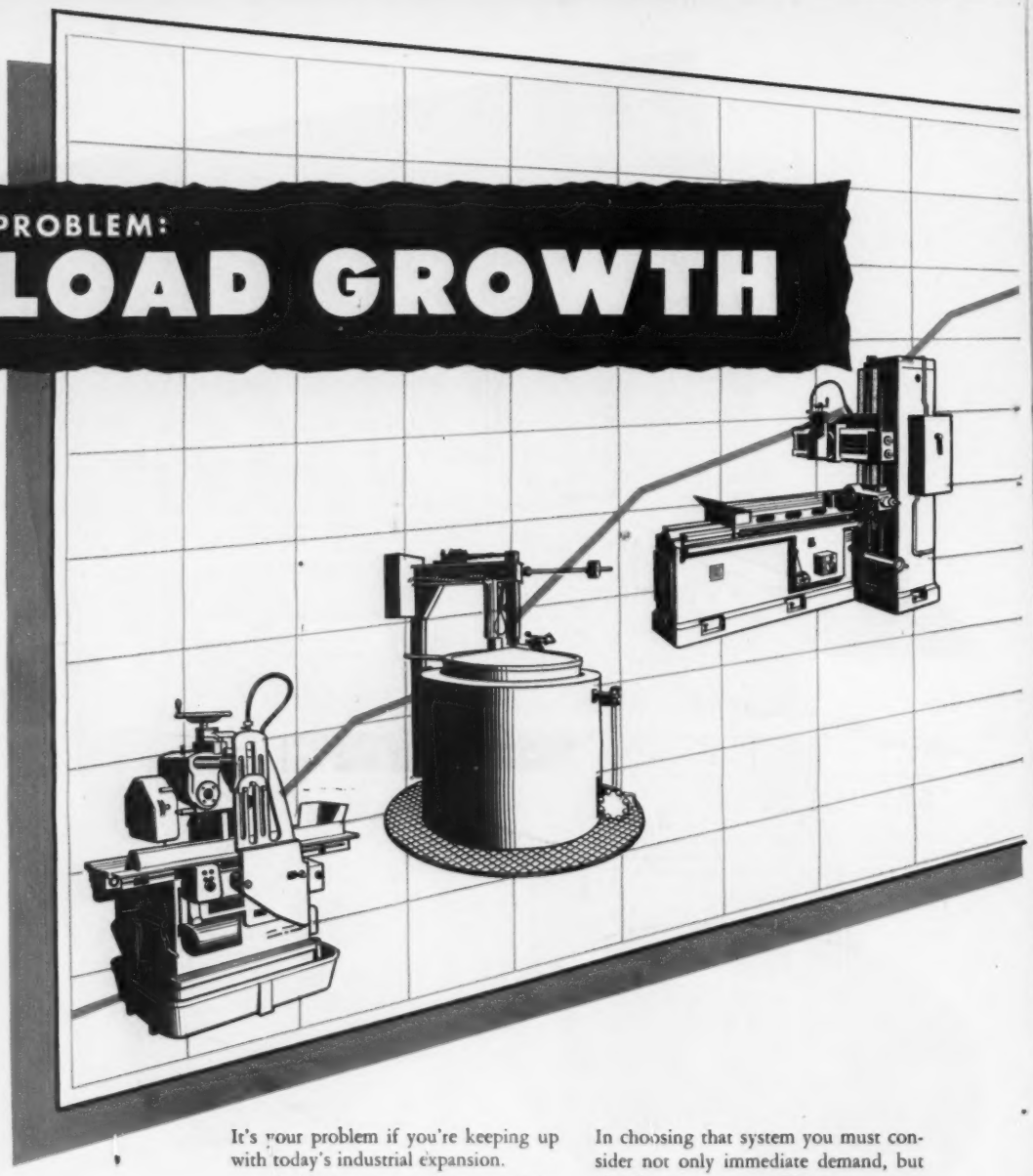
View of operating floor with exhauster of Foster Wheeler ball mill in right background.

CORPORATION • 165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

PROBLEM:

LOAD GROWTH



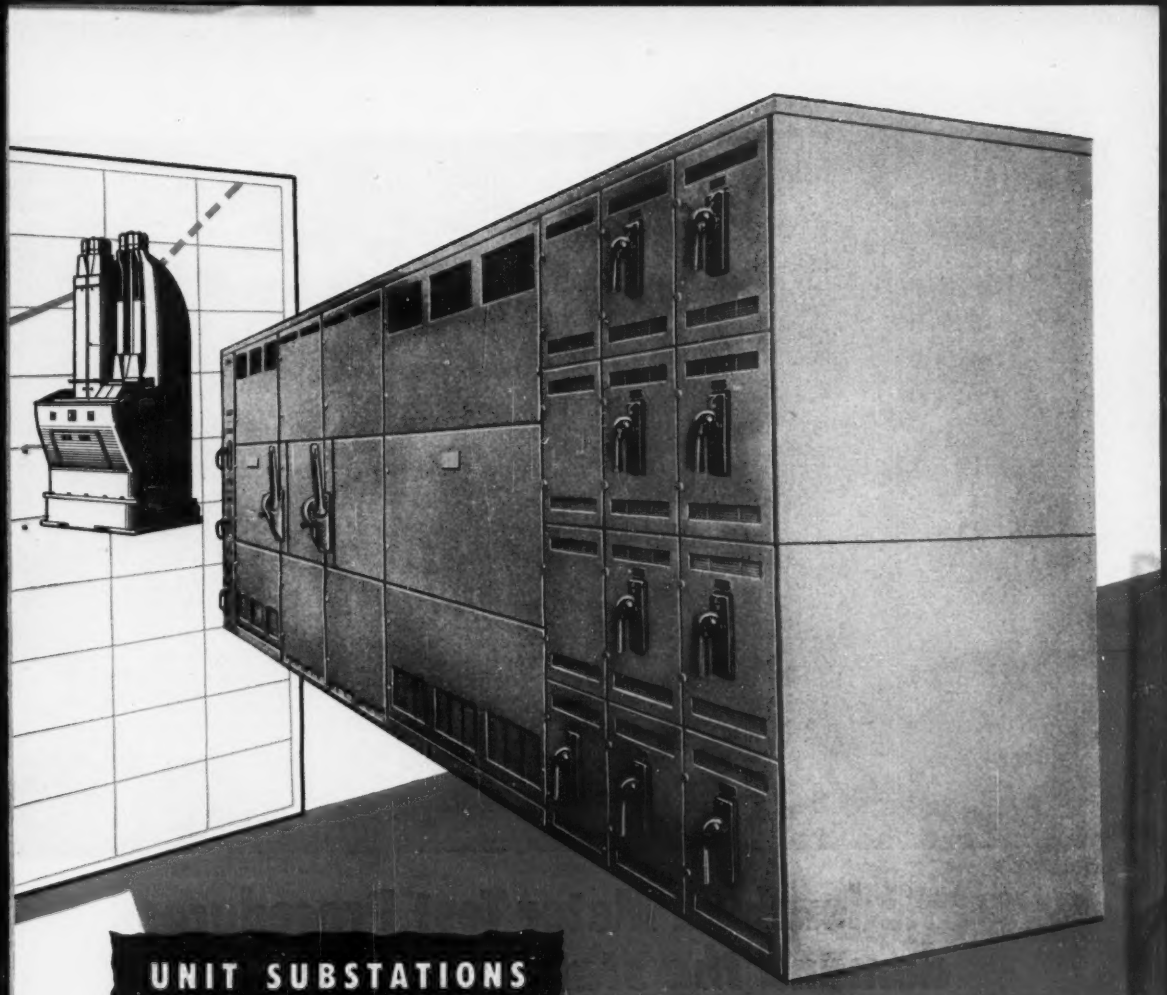
It's your problem if you're keeping up with today's industrial expansion.

And when new production machinery adds load upon load to your electrical system, your planning naturally includes installation of a unit substation system.

In choosing that system you must consider not only immediate demand, but also future expansion. The system must be designed and engineered to meet your specific requirements, flexible enough to be expanded for future needs.

THE ANSWER: I-T-E UNIT SUBSTATIONS!

I-T-E Catalog 9000 describes all types of secondary unit substation equipment, offers concise, easy-to-use information on selection of distribution systems and equipment. One page alone, on cost comparison of basic power distribution systems, may save you weeks of investigation and reduce initial investment. Send for Catalog 9000. I-T-E Circuit Breaker Company, 19th and Hamilton Sts., Philadelphia 30, Pa. Subsidiaries: Railway and Industrial Engineering Co., Greensburg, Pa.; Eastern Power Devices, Ltd., Toronto.



UNIT SUBSTATIONS

Here is a typical I-T-E indoor unit substation with air cooled transformers. Substation arrangement puts primary load break interrupter switches and transformers in the center. As load grows, addition of low voltage switchgear to either end is simple and inexpensive.

Uniform appearance of the structure and symmetry of enclosing panels are consistent with the operating excellence of I-T-E switchgear.

The I-T-E Company

Modernized Meter Test Procedures demand *the standard of accuracy*

The growing interest in shop testing of service meters indicates that *now* is the time to re-examine your test equipment and procedures. Maximum efficiency and maximum accuracy are assured only when modern laborsaving equipment is combined with the most accurate standard. The accuracy of your service meter testing can be no better than the accuracy of your rotating standard.

Sangamo Type J Rotating Standards can be your standard of accuracy because they are:

- ACCURATE—as the result of fundamental design.
- ACCURATE—as the result of painstaking, expert calibration.
- ACCURATE—since calibration is practically unaffected by age or usage.

Build *your* modernization program around this standard of accuracy—the Sangamo Type J Rotating Standard. Specific technical information is given in Bulletin 290. Write for your copy today.

SANGAMO — *Only Measured Facts are Known Facts*

Sangamo Type J
Rotating Standards
(The Standard of Accuracy)

Straight line load curve on all current ranges.

Thermal current carrying capacity to 200% load.

Minimum deviation between current ranges.

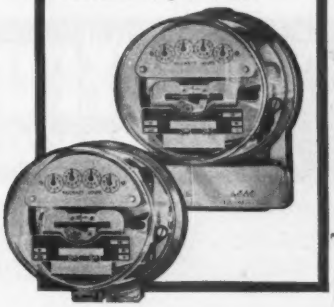
Fully compensated for temperature and voltage variations.

Available in 1, 3, 4 or 5 current ranges.

The above close-up shows the unique arrangement used by the Southern California Edison Company. The Sangamo Type J Rotating Standard is mounted horizontally behind a panel with a combination of mirrors to provide for maximum ease of reading. The large photograph shows their very modern Meter Testing Department.

Sangamo J Meters

These watthour meters meet today's requirements and tomorrow's anticipated loads with sustained accuracy, economy of maintenance and troublefree performance.



SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

HERE ARE Down-to-Earth Reasons WHY I SPECIFY ORANGEBURG

—Says the Utility Engineer

In plain language this is what the Utility Engineer means. Orangeburg Conduit provides a *permanent* cable raceway *underground*. It will not corrode, lasts indefinitely. Its impermeable wall and tight joints prevent corrosive ground waters from entering. Orangeburg lays faster at lower cost. Protects cable sheath from abrasion when pulled in—also from wear during cable movement due to alternate expansion and contraction with changing loads. Resists acids, alkalis, grease, oil. Orangeburg Conduit is tough, durable and resilient—will not crack or break when properly handled.

PROTECTION . . . POWER . . . PRODUCTION

They are big words under today's conditions because permanently protected cables keep the *power* flowing and the *production* up to essential volume. The Utility Engineer appreciates the close connection between cable *health* and community *wealth*. Orangeburg is a magic name . . . and has been for 58 years . . . with public utilities and municipalities . . . because the lasting protection that Orangeburg Conduit gives electrical services underground assures uninterrupted power for all users of electricity.

Orangeburg saves money, too, by faster and easier handling, tooling and laying . . . and by supplying a complete line of delay-preventing standard fittings for conduit. Orangeburg Manufacturing Co., Inc., Orangeburg, N. Y.

ORANGEBURG STANDARD

. . . installed with concrete encasement. The preferred conduit for banks of three or more ducts.

ORANGEBURG NOCRETE

. . . installed without concrete encasement. Its extra heavy wall makes NOCRETE practical for many single or double duct runs.

ORANGEBURG FIBRE CONDUIT

STANDARD Installed with Concrete

NOCRETE Installed without Concrete

GENERAL ELECTRIC SUPPLY CORPORATION

DISTRIBUTORS, ORANGEBURG FIBRE CONDUIT

GraybaR ELECTRIC COMPANY

MAKE A

Good Connection

WITH **WEAVER**

1-WS
Copper to Copper
(Also available for general purpose use —1-WS-C)

WSB-C
Cadmium Plated
General Purpose
(Also available for copper to copper connections—WSB)

K-1 Jumper Clamp
(Also available for aluminum, steel, or copper to similar conductor.)

A-111 Armor Rod Jumper Clamp
(Also available for aluminum to aluminum connections.)

HIGH STRENGTH CONSTRUCTION THROUGHOUT — WEAVER HOT LINE CLAMPS are cast of high strength ELECTRO-BRONZE. This exceptionally strong metal is specially alloyed in our own electric furnaces so that each operation from melting to final assembly is quality controlled.

MAKE BETTER CONNECTIONS — With WEAVER HOT LINE CLAMPS you are assured of high pressure connections, since ELECTRO-BRONZE produces low friction, free running threads which efficiently convert more of the tightening torque to pressure on the conductor — without distortion — and there is no freezing of the tightening bolt with ELECTRO-BRONZE.

COVER LARGE WIRE RANGE — The popular catalog #1WS, for instance, accommodates number 6 to 4/0 stranded main and number 6 to 2/0 tap — this feature cuts inventory.

DESIGNED TO STAY TIGHT — Both main line and tap wire connections are secured with SHAKEPROOF lockwashers to provide permanent, trouble-free connections that won't loosen under vibration.

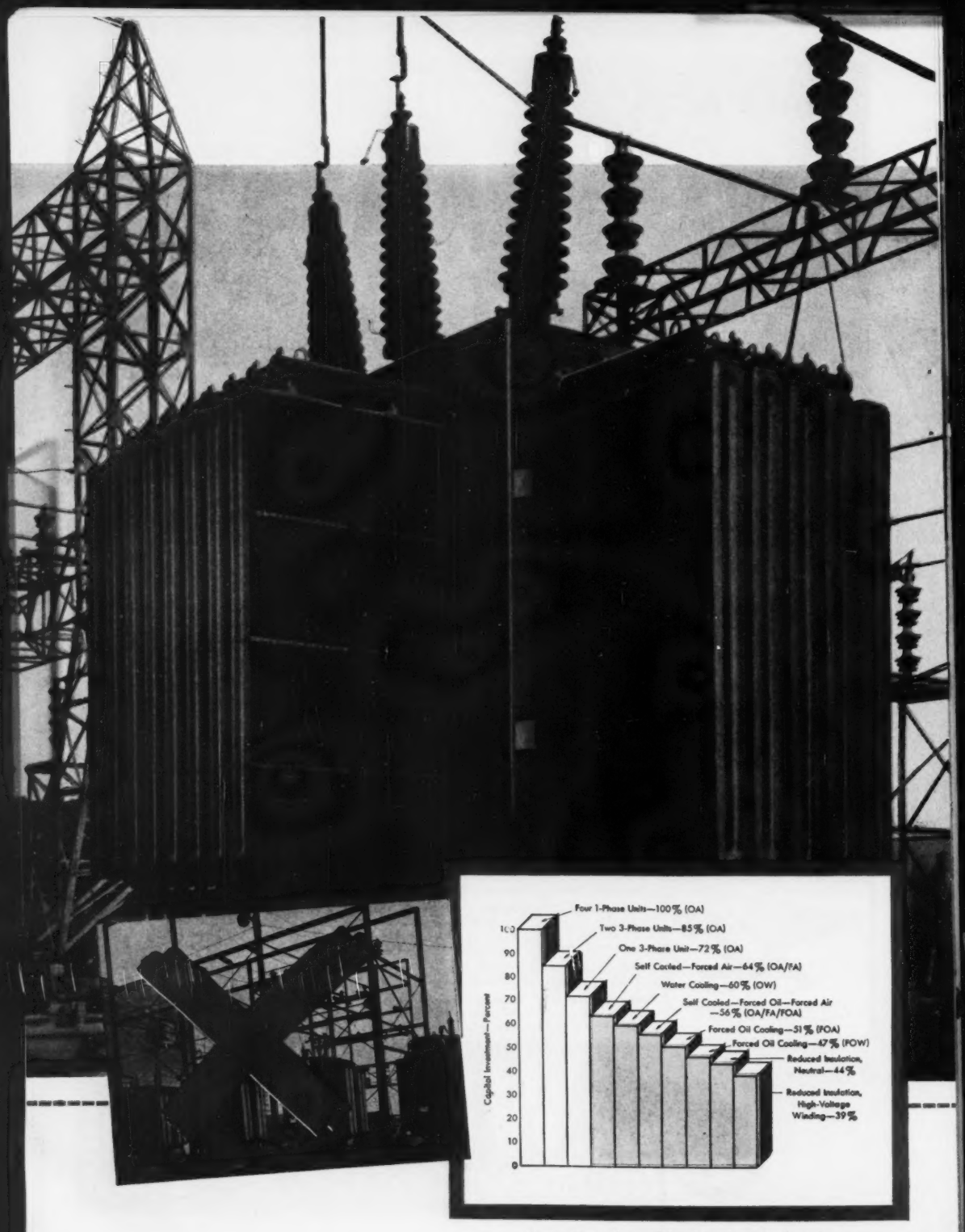
FOR TOP QUALITY AT LOWEST COST . . . YOU CAN'T BEAT WEAVER HOT LINE CLAMPS!

Write for the latest Weaver Catalogue

JAW

J.A. WEAVER CO.

2110 HOWARD ST · ST.LOUIS, MO · CE. 0881



Summation of possible reductions in investment for generating station transformer banks.

MODERN 3-PHASE POWER TRANSFORMERS

Cut Capital Investment 15% to 28%

Important improvements in power transformer design and applications can bring savings that add up to 50%, and more.

For example, banks of single-phase transformers are being superseded by three-phase units, used singly and in pairs. In a typical instance, two three-phase transformers cut initial cost by 15% over a four-unit single-phase bank. Since reliability has been increased to a point where outages are practically negligible, a single large three-phase unit can be used, at an additional savings of 15%, or an over-all economy of 28% . . . and there's an appreciable improvement in transformer efficiency.

These examples are based on straight self-cooled design. By various applications of new cooling and insulating techniques, capital savings can be made to reach, or even exceed, 50%.

Westinghouse Power Transformers are smaller and lighter per kva than any other transformer on the market. As a result, you can expect these additional savings:

1. **Reduced space required.**
2. **Smaller foundations.**
3. **Smaller superstructures.**
4. **Lower field-assembly expense. Transformers shipped more completely assembled.**
5. **Lower maintenance expense... Rugged all-welded construction plus smaller size.**

Your Westinghouse representative will be glad to give you complete details. Phone him today, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

J-70580

WESTINGHOUSE POWER TRANSFORMERS ARE SMALLER AND LIGHTER PER KVA THAN ANY OTHER TRANSFORMER . . . YET THEY GIVE SUPERIOR PERFORMANCE

YOU CAN BE SURE... IF IT'S
Westinghouse

POWER TRANSFORMERS

WESTINGHOUSE

your plant is as OLD as its wiring system!

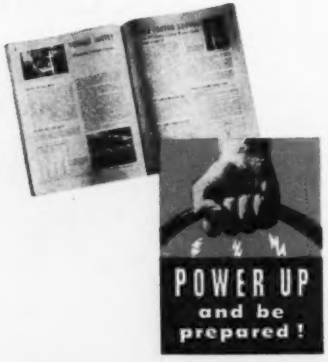
ANACONDA "POWER UP"
CAMPAIGN HELPS UTILITIES
HERE IS another advertisement in the Anaconda "POWER UP — And Be Prepared" campaign urging industry to make more efficient use of the power it buys from you. This Anaconda campaign is also being directed to contractors and wholesalers.
As in our previous industry-wide campaigns, we again offer advertisement reprints, imprinted with your letterhead and message —for mailing to your industrial power customers.

You can have the newest and best machinery money will buy; you may have the newest in modern plant design—but if your wiring system is obsolete you still have an old plant.

Fast-moving, full-scale production is being stymied in 9 out of every 10 industrial plants by overworked, obsolete wiring systems.

Now more than ever, you should be utilizing all the power you pay for. A dependable, up-to-date wiring system eliminates power breakdowns, lost man-hours . . . and adds strength to our national production.

Determine the condition of your plant wiring system today. Call in your utility, plant or consulting engineer or electrical contractor and arrange to have him survey your plant. And, most important of all, send for your free copy of *"Power Up—And Be Prepared."* This complete modern wiring guide shows you how efficient wiring systems cut down expenses and build up your power efficiency. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 21899

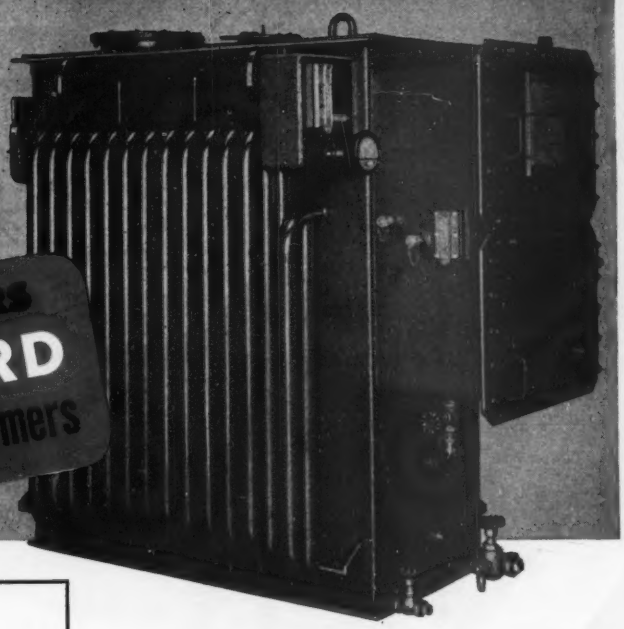


the right cable for the job

ANACONDA®

WIRE AND CABLE

YOU BENEFIT ...by Choosing ALLIS-CHALMERS STANDARD Network Transformers



CLASSIFICATIONS

300 kva 500 kva 750 kva 1000 kva

Available in high voltage insulation classes: 5 kv 15 kv 22 kv 33kv

5 kv and lower (taps available at extra cost); 7.2 kv to 33 kv (four 2½% taps below normal); low voltage: 125/216Y, 4 wire.

YOU CAN GAIN important advantages by choosing Allis-Chalmers standard network designs and ratings for these reasons:

1. Standard designs speed production . . . permit more attractive delivery.
2. With mechanical and electrical data immediately available your selection of the right network transformer is made easier.
3. Standard construction and accessory arrangement lends itself to simplified service procedure.

Your application problem is further simplified because Allis-Chalmers builds all three basic types of network transformers in a wide range of standard ratings: oil filled, *Chlorextol* liquid filled and sealed dry type. A-C engineers can make unbiased recommendations for your system. For most installations you eliminate special engineering by selecting from standard designs and ratings.

Take advantage of Allis-Chalmers wide transformer range and experience. Call in an Allis-Chalmers representative early in your network planning stages. Offices in 64 principal cities.

ECONOMY CONSTRUCTION FEATURES

MAIN COVER and switch compartment welded to the tank eliminate large gasket.

TAP CHANGING MECHANISM controls three phases simultaneously. It is operated by removing a 2-inch pipe plug in the main cover and inserting the special wrench held in a bracket adjacent to the sealed entrance. The tap changer handle cannot be removed unless the tap changer is correctly positioned.

UNDERCOATING COMPOUND gives extra protection to base area after the tank surfaces are given 3 coats of baked-on paint to protect them against corrosive atmospheres.

ACCESSORIES are located on the high voltage end of the transformer. Gages are at eye level.

FILTER PRESS VALVES are located together but the system provides cross flow for complete interchange of liquid. Threaded valves are solder wiped for added protection against leaks.

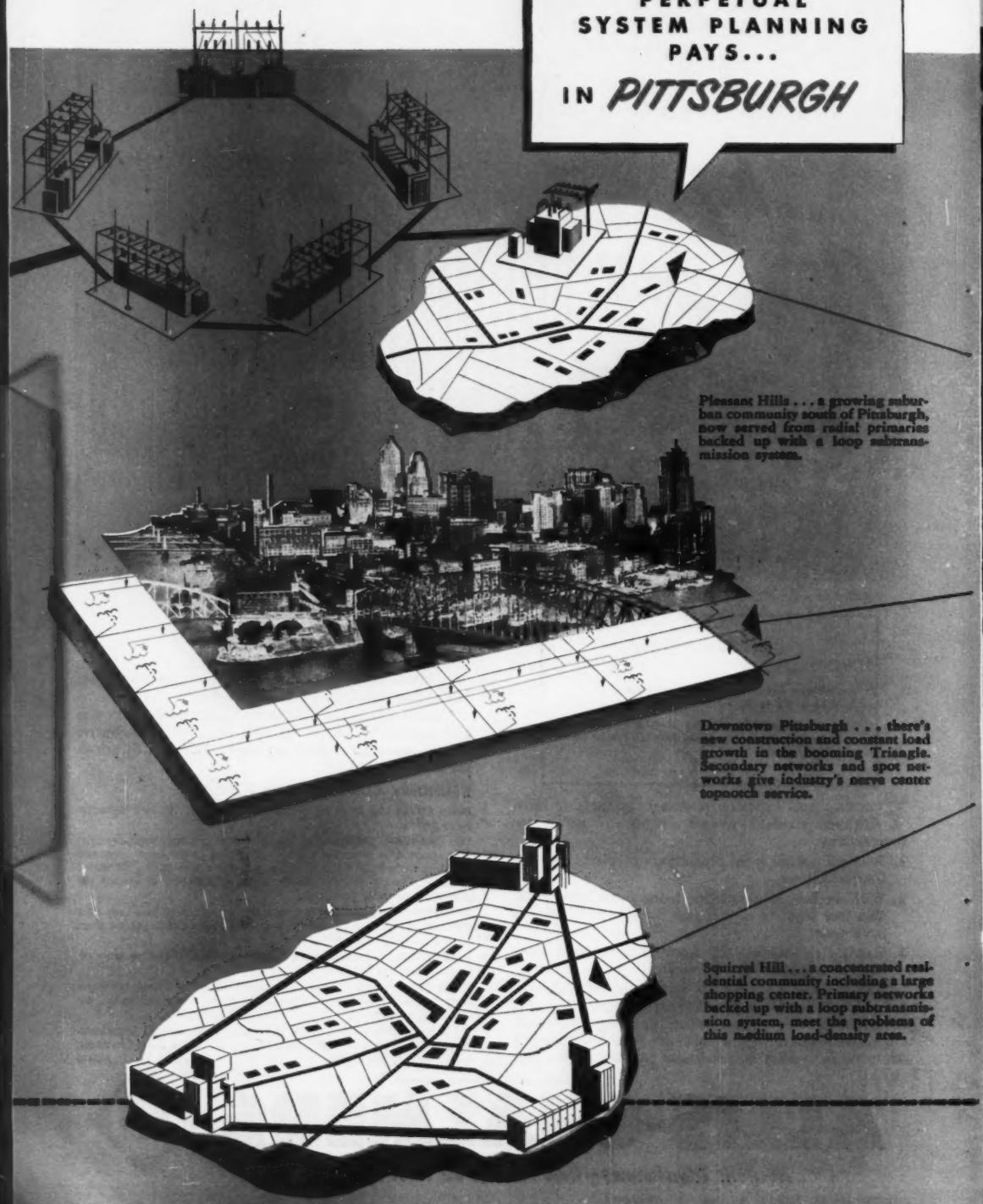
For more information about Allis-Chalmers network transformers contact your local A-C sales office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3440

Chlorextol is an Allis-Chalmers trademark.

ALLIS-CHALMERS

Network Transformers—Over 1,000,000 KVA Installed

PERPETUAL SYSTEM PLANNING PAYS... IN *PITTSBURGH*



Pleasant Hills . . . a growing suburban community south of Pittsburgh, now served from radial primaries backed up with a loop subtransmission system.

Downtown Pittsburgh . . . there's new construction and constant load growth in the booming Triangle. Secondary networks and spot networks give industry's nerve center topnotch service.

Squirrel Hill . . . a concentrated residential community including a large shopping center. Primary networks backed up with a loop subtransmission system, meet the problems of this medium load-density area.

"Simplified Systems

meet our load growth...
reduce distribution costs"

In Pittsburgh you'll find all the benefits from almost 30 years of sound system planning. Main benefit—complete flexibility to meet all load growth economically.

Duquesne Light Company take full advantage of the latest advances in the design and reliability of modern unitized electrical apparatus. Small blocks of power are integrated to improve their own unique Service Continuity Standards without uprooting the entire system.

CASE I **Greatly increased load with subsequent voltage problems necessitated improved service continuity and the elimination of line losses for this suburban area. Proper system planning utilized a nearby subtransmission loop by installing a unit-type single-feeder substation. Pleasant Hills gets adequate service and costly field-erected substations are eliminated.**

CASE II **Secondary networks have provided Pittsburgh's Triangle with the highest quality of service since 1926. Badly congested primary feeders and small transformer installations were eliminated. Duquesne Light Company also offers the spot network form of the system for large commercial buildings. Sound planning enabled Pittsburgh to grow without any basic changes in the system.**

CASE III **4 kv primary networks were installed in 1949 to economically meet the Service Continuity Standards for this medium load-density area. Careful planning based on load growth, income potential and geographic conditions dictated the necessity for a primary network system. Now, service continuity is high and there's complete flexibility to meet any increase or change in load density.**

BECAUSE OF SOUND PLANNING, systems have been simplified, small blocks of power integrated, high service standards maintained, power distribution costs reduced. Westinghouse equipment and co-ordinated distribution apparatus have contributed to the ease and speed of change-over, dependability, and economy of this model operation. Use Westinghouse as your planning partner. Call us when you're ready to modernize. Start modern planning now!

J-97154

YOU CAN BE SURE... IF IT'S

Westinghouse

SYSTEM PLANNING SERVICE

IT HAS BEEN AMERICAN BLOWER'S PRIVILEGE TO SERVE THESE AND OTHER PRODUCERS OF POWER IN THE PUBLIC UTILITY FIELD

Buffalo Niagara Electric Corporation
Carolina Power and Light Company
Central Arizona Power & Light Company
Central Illinois Electric & Gas Company
Central Illinois Light Company
Columbus & Southern Ohio Electric Company
Connecticut Light & Power Company
Consolidated Edison Company of New York
Consumers Power Company
Consolidated Gas, Electric Light & Power Co. of Baltimore
Connecticut Power Company
Dairyland Power Co-operative
Dallas Power & Light Company
Detroit Edison Company, The
Duke Power Company
Eastern Shores Public Service Company
Fitchburg Gas & Electric Light Company
Florida Power Corporation
Florida Power & Light Company
Gulf Power Company
Hartford Electric Light Company
Indianapolis Power & Light Company
Iowa Public Service Company
Iowa-Illinois Gas & Electric Company
Iowa Power & Light Company
Iowa Electric Light & Power Company
Kansas City Power & Light Company
Kansas Power & Light Company, The
Kansas Gas & Electric Company
Long Island Lighting Company
Los Angeles, California, City of
Louisiana Power & Light Company
Madison Gas & Electric Company
Mississippi Power Company
Missouri Power & Light Company
Nebraska Power Company
Northern Indiana Public Service Corporation
Ohio Edison Company
Oklahoma Gas & Electric Company
Omaha Public Power District
Otter Tail Power Company
Pacific Gas & Electric Company
Pennsylvania Power Company
Philadelphia Electric Company
Potomac Electric Power Company
Public Service Company of Oklahoma
Public Service Electric & Gas Company
Public Service Company of Colorado
Southwestern Public Service Company
Southern Indiana Gas & Electric Company
South Carolina Power Company
Springfield, Illinois, City of
Tampa Electric Company
Texas Electric Service Company
Texas Power & Light Company
Tennessee Valley Authority
Virginia Electric & Power Company
Worcester County Electric Company of Massachusetts

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN

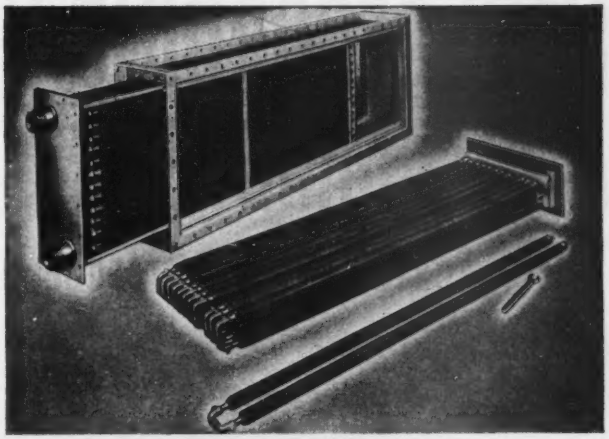
Serving home and industry

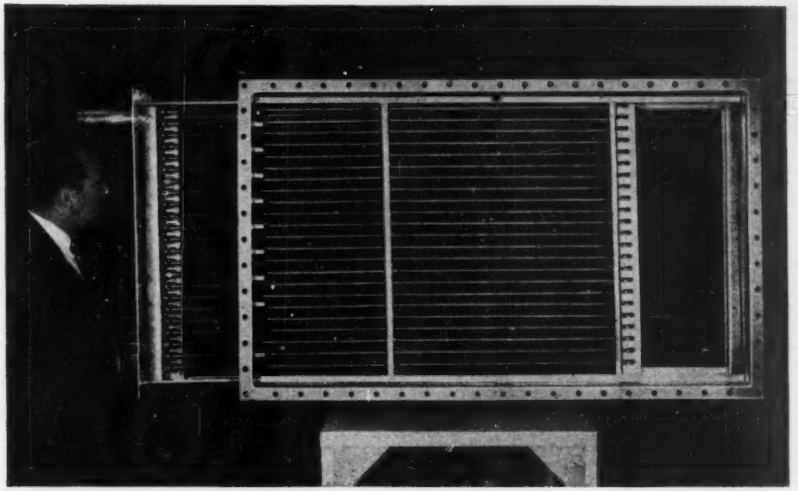
AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

Facts you should know about

AMERICAN BLOWER HEAVY DUTY STEAM COILS

American Blower's Type H Heavy Duty Steam Coil has been developed for a single purpose: to furnish public utilities and industry with a heating coil designed and built in accordance with highest quality industrial equipment standards. It is a coil possessing strength, corrosion resistance and complete accessibility.





Above, Type H Heavy Duty Coil and component parts. The entire heating element is removable from the casing and can be completely dismantled for inspection, maintenance and repair. Individual tubes are replaceable.

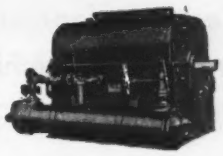
Type H Coils are available in a wide range of sizes and are designed, tested and guaranteed for operation with steam pressures to 350 lbs. gauge. Casing is heavy steel, welded airtight.

For detailed information on American Blower Type H Coils, write for Bulletin B-1318, or call our nearest branch office.

And if you'd like complete data on other American Blower power plant equipment — Mechanical Draft Fans, Fly Ash Precipitators and Gyrol Fluid Drives for boiler feed pumps and fan control—write, stating your requirements, or phone the nearest American Blower Branch Office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary corporation



Gyrol Fluid Drives

for Mechanical Draft Fans are also a part of American Blower's wide range of products which serve America's leading public utilities.

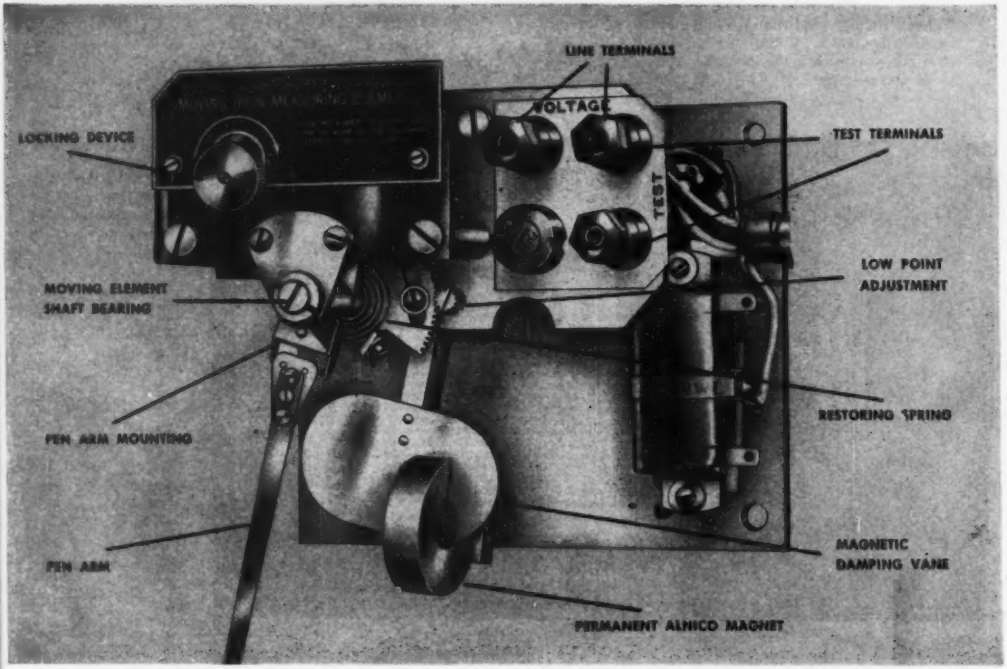
YOUR BEST BUY AMERICAN BLOWER POWER PLANT EQUIPMENT

Serving home and industry

AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS · DETROIT LUBRICATOR · KEWANEE BOILERS · ROSS HEATER · TONAWANDA IRON

NEW RECORDING VOLTMETERS AND AMMETERS announced by Bristol

Featuring High Torque — Low Burden

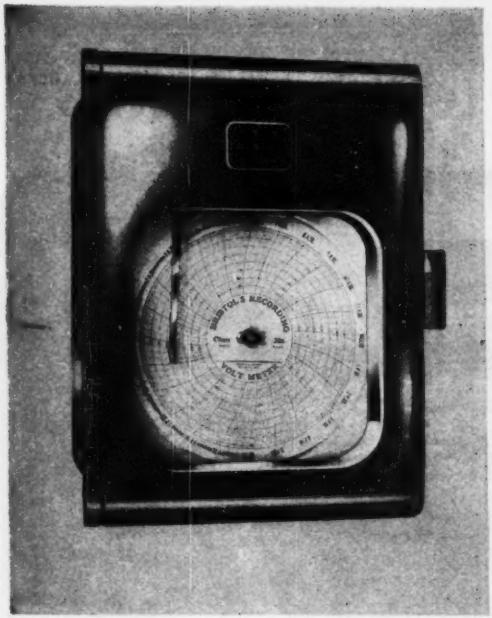


The Latest Development in Electrical Measurement — Outstanding for

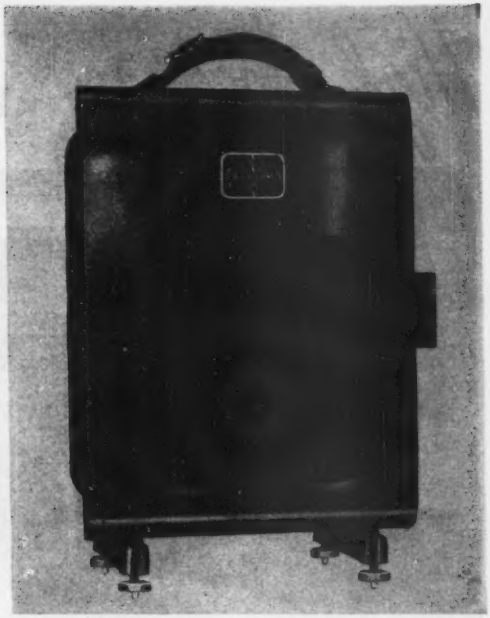
High actuating torque
Low electrical burden
Stability of calibration
Dependable accuracy

THE NEW SERIES 500 RECORDING VOLTMETERS and AMMETERS give you these above features—plus a number of design refinements that make them easier to use and more convenient to service.

The measuring mechanism, for example, is of the moving-iron type—known for high actuating torque and low electrical burden. Bristol-engineered improvements include provision for easy calibration. The rugged construction is your assurance that the accuracy of the original calibration will be retained through the roughest usage. Convenient, accessible locking device protects the measuring mechanism during transit or mishandling. Shock-absorbing stainless steel ball bearings in the measuring mecha-



PERMANENT MOUNTING offered in three models: interchangeable surface and flush, surface-panel, flush-panel. Note the pleasing, well-balanced appearance.



PORTABLE INSTRUMENTS are offered in two models: for setting on floor or table; indoor and outdoor use for mounting on walls or poles and general service.

nism provide further protection. The moving-iron mechanism is sensitive yet extremely rugged.

Other Bristol developments that assure convenience in use include the new Series 500 dust- and moisture-protected die-cast aluminum case, quick-set chart hub for easy chart changing, non-obscuring pen lifter, and snap-on chart plate.

Thus the new Series 500 Recording Voltmeters and Ammeters carry forward a Bristol tradition for design advancement which began nearly 60 years ago. Thousands of Bristol Recording Voltmeters and Ammeters are in use all over the country checking circuit conditions in central stations, sub-stations, and distribution services.

To keep up with the latest in recording electrical instruments, send for Bulletin E1111, addressing THE BRISTOL COMPANY 116 Bristol Road, Waterbury 20, Conn.

FREE 28-PAGE BULLETIN describes latest developments in recording voltmeters and ammeters, gives full information on models, ranges, specifications, and the outstanding new Bristol Moving-Iron Measuring Mechanism.

THE DEPENDABLE GUIDEPOST OF INDUSTRY

BRISTOL

AUTOMATIC CONTROLLING, RECORDING AND TELEMETERING INSTRUMENTS

High Accuracy AT LOW ENERGY LEVELS

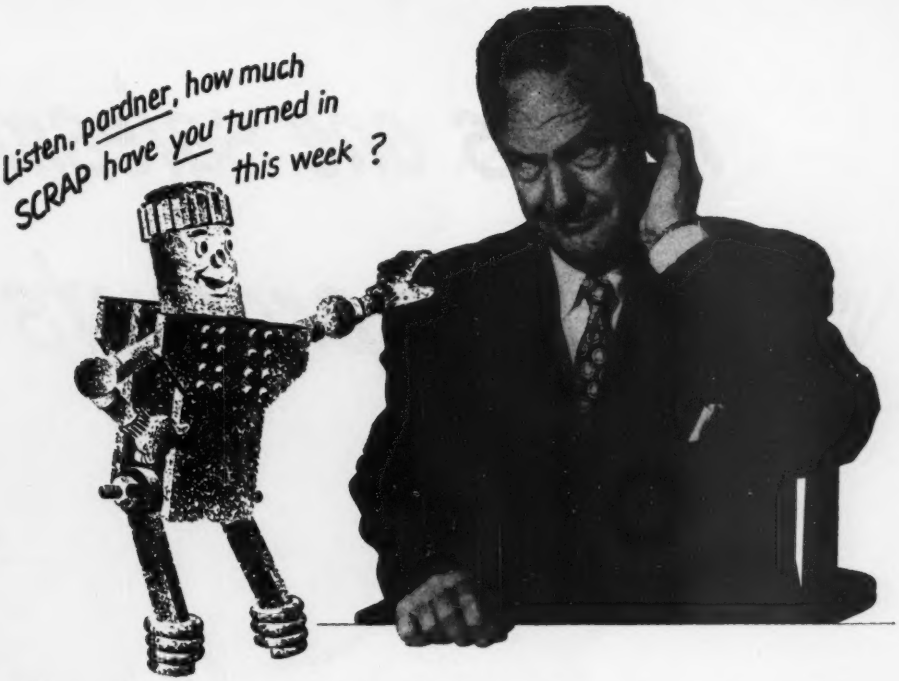
WESTON
Model 622

High sensitivity
• PORTABLE •
Instruments

Combining extreme sensitivity with high accuracy and a 6.1 inch scale, Weston Model 622 instruments are ideally suited for precise measurements of potential and current at the very low energy levels encountered in nuclear physics, electronics and electro-chemical research or in general test work. Hand calibrated, double pivoted, electrostatically and magnetically shielded.

These instruments are available as d-c voltmeters, millivoltmeters, milliammeters and microammeters; electrolysis voltmillivoltmeters and high resistance voltmeters. They are also made as thermocouple ammeters, milliammeters, and voltmeters; and as a-c rectifier type instruments. For technical data consult your Weston Representative, or write Weston Electrical Instrument Corporation, 594 Frelinghuysen Avenue, Newark 5, New Jersey . . . manufacturers of Weston and TAGliabue instruments.

WESTON *Instruments*



Today, the steel business is your business

—*it needs all your SCRAP, Now!*

SUPPOSE that every steel user were suddenly told that he had to turn in a half-ton of scrap before he could get a ton of steel. It would start the most gosh-almighty treasure hunt for scrap that ever happened.

In effect, this "no-scrap, no-steel" situation virtually exists. For without *all* the scrap that industry can search out and start on its way to the mills, steel production will surely drop. It's as serious as that.

More scrap is urgently needed. Today the mills are turning out more steel than ever before. But they're scraping the bottom of the barrel as far as scrap is concerned. Defense and domestic demands for steel simply cannot be met unless at least 100,000 tons of "purchased" scrap roll into the furnaces—*every day.*

The bulk of this scrap must come from industry. That's why we're asking for your all-out help. That's why it's so important that you make the drive for scrap part of your daily operations. Make it your business to encourage every employee to report any obsolete, broken or worn-out machinery, tool or equipment that has seen its day. From this dormant "junk" must come the heavy melting scrap that the mills need most. Don't let your scrap lie idle; send it on its way. How about it, pardner?

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

This page would ordinarily be used to tell you about

U·S·S FORGINGS

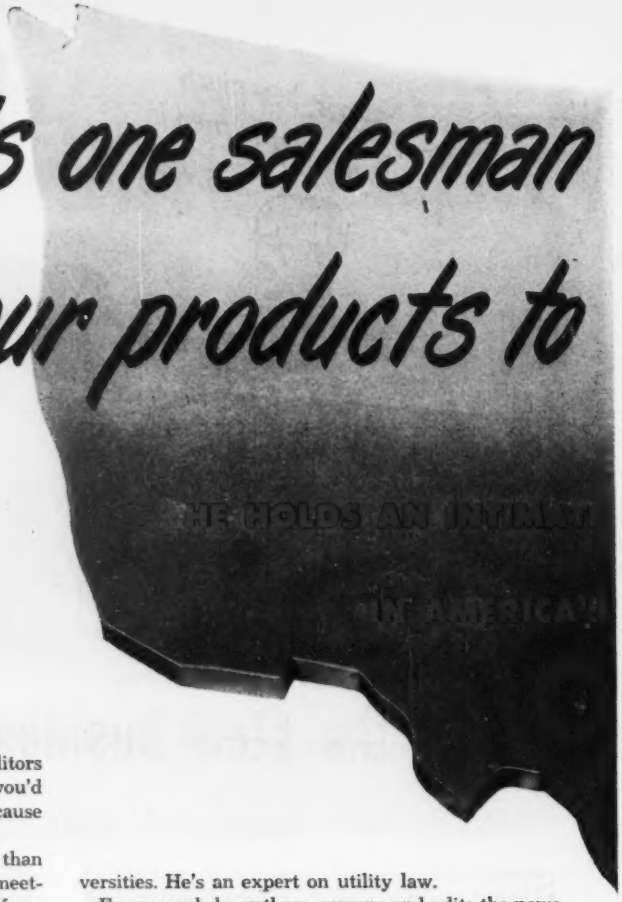
but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

UNITED STATES STEEL COMPANY, PITTSBURGH · COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM · UNITED STATES STEEL EXPORT COMPANY, NEW YORK

1-1326

UNITED STATES STEEL

Here's one salesman your products to



If you took all of ELECTRICAL WORLD's 20 editors and rolled them into a composite personality, you'd have the strongest salesman in the industry. Because here's the kind of superman you'd have:

In a year's time he cheerfully travels more than 200,000 miles, taking part in some 250 industry meetings and conventions. He is everywhere at once, from coast to coast, talking to industry executives, engineers and operating men in every state, inspecting new plants, watching experiments, examining problems and their solutions.

He's a top-notch observer, analyst and reporter; but he's far more than that. He's an active, working part of the electric power industry and a tireless contributor to industry organizations.

He appears on the programs of meetings and conventions dozens of times each year, for he speaks the language, and no wonder: Before he ever thought of joining Electrical World, he gathered 137 years of field experience in all phases of the industry, from the generation of electrical energy to selling appliances.

His abilities and experience are far-reaching and many-sided. He has written and contributed to many books, and he edits the Standard Handbook for Electrical Engineers. He holds several patents on industry equipment, including one for a meter widely used. He has devoted 34 years to teaching his craft to college students in some of our oldest and most famous universities. He's an expert on utility law.

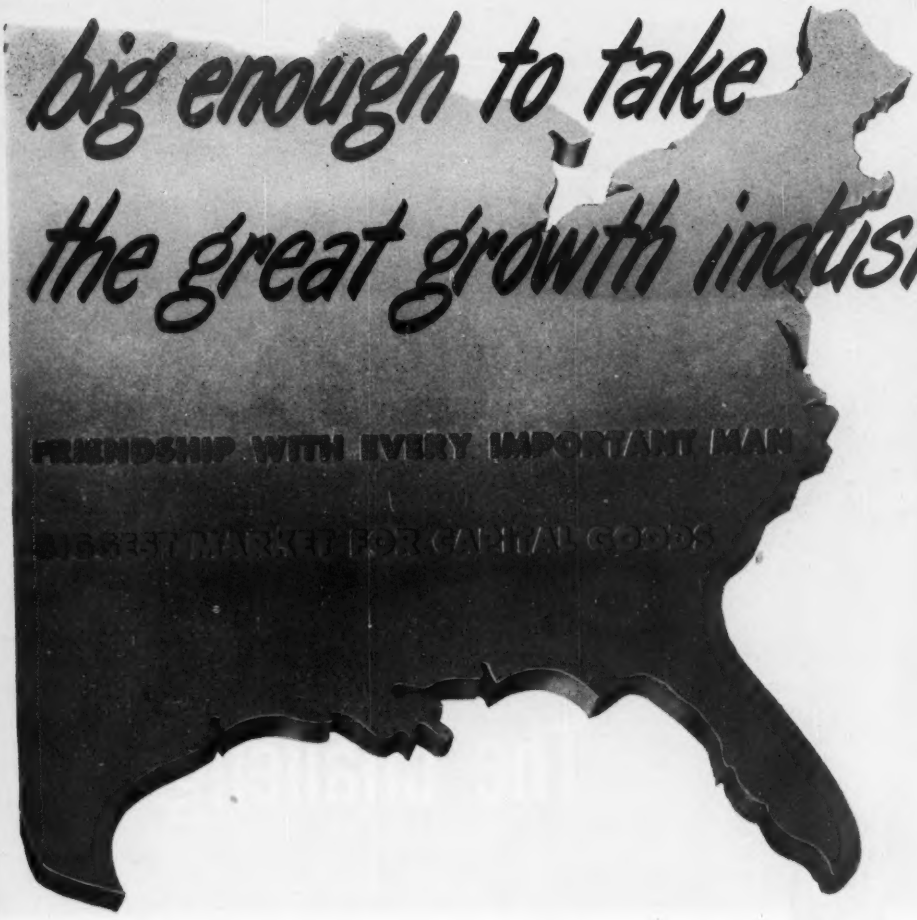
Every week he gathers, screens and edits the news of the industry (and nobody else does), using to good advantage his nearly 200 years of editorial experience, including a score on newspapers.

He is a year-around worker on American Institute of Electrical Engineers Committees. Listing these activities, and his engineering degrees and memberships in honorary societies, would take several extra pages.

In his job today he is searchingly self-critical. He constantly changes ELECTRICAL WORLD, to make it fit more exactly into a changing and vastly expanding industry – to become always closer and more useful to the men on the job.

He holds the interest and confidence of 22,213 men who direct and operate the electric power industry – and who will spend more money on capital goods this year and next year than executives of any other industry.

Few business papers can set down dimensions so all-encompassing as these, but it takes this kind of knowledge, experience and tireless effort to serve the great growth industry.



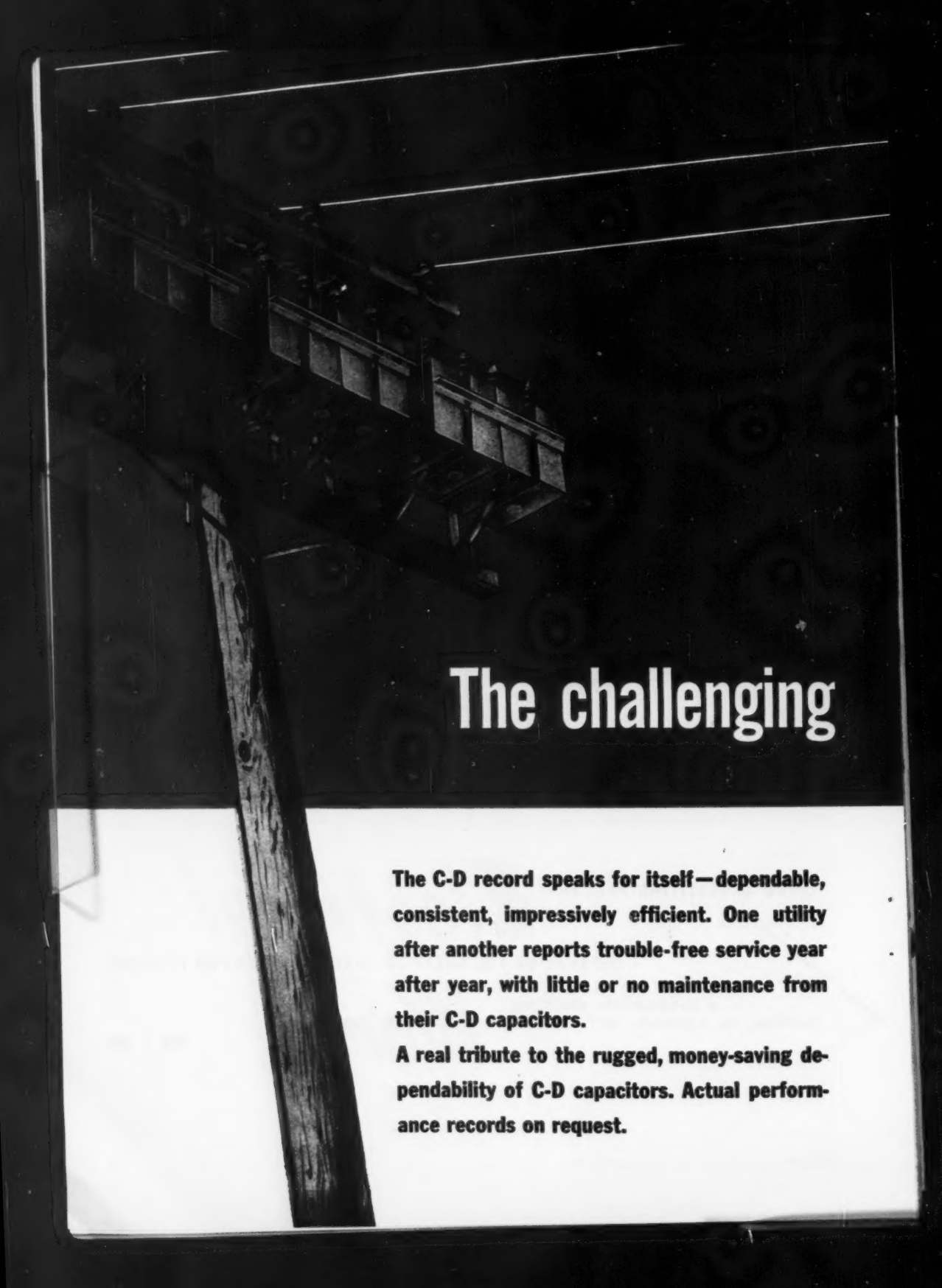
GOOD ADVERTISING PAYS IN

Electrical World

JOURNAL OF THE GREAT GROWTH INDUSTRY FOR 77 YEARS

A McGRAW-HILL MAGAZINE
McGRAW-HILL BUILDING, NEW YORK 18

ABC • ABP



The challenging

The C-D record speaks for itself—dependable, consistent, impressively efficient. One utility after another reports trouble-free service year after year, with little or no maintenance from their C-D capacitors.

A real tribute to the rugged, money-saving dependability of C-D capacitors. Actual performance records on request.

performance of C-D capacitors

These exclusive C-D features mean more value for your capacitor dollar:

- Case SAND-BLASTED for longer-lasting finish
- Solderless service connector
- Heavy-duty wet process porcelain bushings for longer creepage path, less breakage, higher impulse rating
- Wide margin between paper and foil provides higher impulse level
- Capacitor impregnated and case filled with non-inflammable, non-explosive Dykanol
- Use of C-D's Dykanol results in lower unit weight per Kvar; high stability; long life
- Many small sections in series-parallel results in low voltage gradient; no corona; lowest dielectric unit stress
- Only C-D capacitors (from 230 to 13,800 volts), are tested at full rated voltage for a period sufficient to establish ultimate heat rise

If you are considering an installation of industrial, station or pole-type capacitors for power-factor improvement, you can save maintenance dollars by talking it over with a C-D engineer. Cornell-Dubilier Electric Corp., Dept. D-91, South Plainfield, N. J.

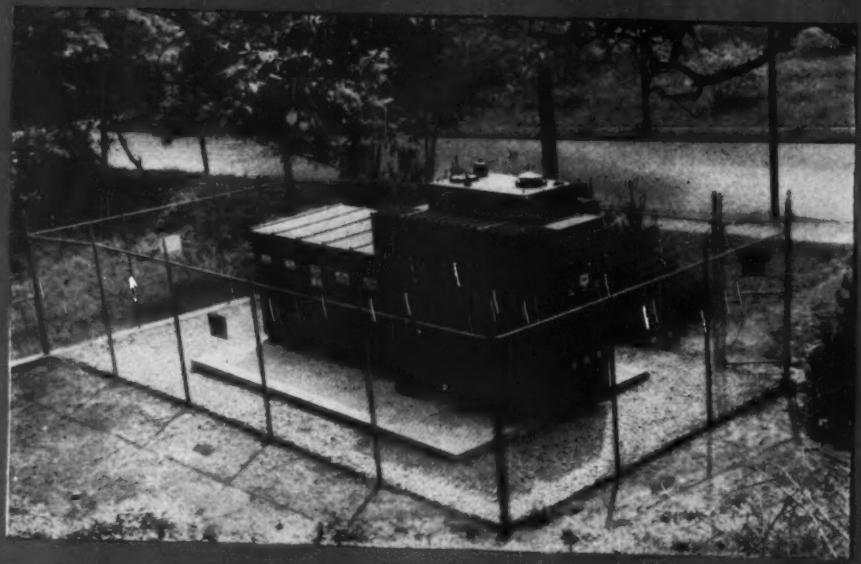
1910-1951

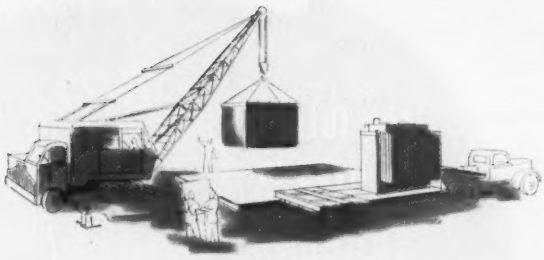
CONSISTENTLY DEPENDABLE

CORNELL-DUBILIER CAPACITORS

PLANTS IN: SOUTH PLAINFIELD, N. J.; NEW BEDFORD, WORCESTER, CAMBRIDGE, MASS.; PROVIDENCE, R. I.; INDIANAPOLIS, IND.; FUQUAY SPRINGS, N. C. AND SUBSIDIARY: THE RADIART CORP., CLEVELAND, OHIO

FORT HILL
17
13 KV
GROUND SW
INERTAIRE
CONTROL





Consolidated Edison installs another Westinghouse Unit Substation . . .

for lower, long-range distribution costs!

Con Edison's expansion program aims at *long-range* distribution economy. That's why —wherever possible—they utilize modern unit substations. And what they have to say about a recent Westinghouse installation indicates how conveniently they—*and you*—can attain this objective.

"Its compact, factory-assembled design enabled us to immediately realize savings in real estate costs, in preparation of the installation site and in the actual installation itself. Also, it is contributing to better electrical service by improving voltage conditions. Most important, its flexibility and low-cost maintenance features will enable us to *economically maintain* high standards of service in an area where considerable load growth is anticipated."

Con Edison enjoys these benefits because Westinghouse Unit Substations are specifically designed to meet today's power distribution problems. "Unitized" construction enables you to add "blocks of power" to accommodate increased load requirements. And they're available in types to serve the most modern distribution systems.

For complete information, get your copy of Booklet B-4061. Ask your Westinghouse Representative or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Penna. J-60758

YOU CAN BE SURE... IF IT'S Westinghouse

UNIT SUBSTATIONS

the future lives in men with ideas

Even the miracle man of Menlo Park was surprised at the results of his early experimentation with dynamo design. Edison's ungainly "longwaisted Mary Anns", built in 1883 to improve upon existing dynamos having efficiencies of 38% or less, were almost 2½ times as efficient! One of thousands of notable contributions to power generation, this event helped to realize the great IDEA of an electrified America.

KERITE—already well known as an insulating material when the electric power industry began to take form—assumed an early, important, and continuing role in the insulation of aerial, underground, and submarine cable. Its properties, still unrivaled today, are proving themselves in more and more vital circuit applications.

By conscientious workmanship, careful handling, and a continuing search for new applications of its unique formula, The Kerite Company has been able to anticipate the power industry's needs. It will continue to apply itself to the technical world of "ideas" in which now, as in Edison's day, the future of America's power still lives.

DAYS KERITE

KERITE CABLE

Kerite Insulation—Your Cable's Best Life Insurance

Editorials

Utilities – A Good Investment

Electric utility equities, particularly common stocks, are recommended as safe investments by many financial institutions. This position is taken in the face of higher income taxes, operating expenses, and construction costs. Even the supposed inflexibility of this industry to inflation has often been ignored.

Why does the electric utility receive and merit such a position of esteem in the eyes of the financial community and the investor? The record of earnings in recent months is no indication of a basis for such confidence. Gross income is down to 1950 levels, and estimates for 1951 indicate that the common stockholder will have no more earnings to his credit than in 1950 although electric plant accounts have increased 10%. The income tax bill is going up but with some possible overall tax relief by way of elimination of the 3 1/3% electrical energy tax. Wages of employees will increase by an amount at least equal to the gain in the consumer price index. With expenditures for plant additions breaking all records, the depreciation and interest charges must grow proportionately. Interest rates have already been upped to conform with the change in government bond interest. On top of this, inflation destroys some asset values of the business.

Now that we have listed all of the reasons why utility common stock might be in disfavor, let us look at the positive side of the equation. Electric utility stocks are sound investments for the reasons which we will enumerate. Electric utilities have experienced and qualified managements who are well trained for their jobs. The industry will continue to grow at a relatively rapid rate for an indefinitely long period. Technological improvements along with economies inherent in growth tend to reduce costs per unit of output. These forces are in direct proportion to the rate of growth which is now at a maximum level. Sound judgment in building existing systems which now cover almost 100% of service areas permits additions of new customers and loads at a minimum investment.

Electric utilities have well trained employees with long service records. They have little trouble with strikes or employee morale. The utility is a good place to work. On the whole regulation has been flexible, and rate increases are granted where necessary. Recent rate adjustments along with those applied for will go far toward alleviating the current earning record. Even then, because the more electricity you use the less it costs, the average rate will rarely go up enough to cause customers to complain.

The sum total of these factors brings the conclusion that the common stockholder of electric utilities has a good investment. (See the Electrical Industry Forecast for 1952 in this issue.)

Aller's Persistency No Virtue

Howard L. Aller is a persistent man. He proved it for the record on Aug. 24. That day at a hearing before an SEC examiner at Washington (EW, Sept. 3, p 4) he reiterated his intention to sell American Power & Light's last major utility to three public utility districts. He emphasized his stand by defying SEC to block the sale and threatening court action to overcome litigation barring that sale.

Subsidiary Washington Water Power Co is one of the top investor-owned electric companies in the Northwest. A progressive company, whose earnings have been increasing each year, its relations with customers, neighbors, and local and state officials are good. There is no clamor by the "peepul" for public power to take over. Contrariwise there is every indication that the people would prefer to see WWP become an independent, locally owned and operated, tax-paying company.

Blocking this goal are the public utility districts and Howard Aller. One cannot blame the PUD's for their stand. It would be a big boost for them to get their hands on the private company. Without it their future is dark. With it they most likely can soon take over all other private companies in the state and make Washington another province in the public power empire.

But Aller can be blamed. He has profited because of our free enterprise system. At 67 he is willing to deprive the others who come after him of these benefits. Yet, in a sense, Aller is only the mouthpiece of the directors, and legally they are only representatives of the stockholders. It was a resolution by the directors that Aller quoted in expressing his firm intention to sell WWP to the PUD's. So they must share the blame with him.

Stockholders Must Share Responsibility

And what about the stockholders, the actual owners of American, who are willing to sell out private enterprise for a "mess of pottage," a few quick dollars now at the expense of future profits, and the unlimited benefits of private enterprise? They, too, must take some of the blame. But they still have time to repent and join the ranks of the righteous. This month SEC will hear oral arguments on possible action to force dissolution of American. Then is the time for all stockholders, even those who own but one or two shares, to make themselves heard. A number of stockholders groups are fighting to keep Washington Water Power in the ranks of free enterprise. These will welcome support, or other groups can be formed. It is noteworthy that Electric Bond & Share Co, owner of 8% of American stock, is fighting the proposed sale to the public utility districts. It is setting a good example for other stockholders to follow.

This is everybody's fight. Aller must be stopped from selling out to public power. He did this in Nebraska. He tried to do it in Oregon. Now he is trying in Washington. He is indeed a persistent man. But we cannot commend him for his persistency.

No Basis for Governmental Development

There is no public interest requiring governmental redevelopment of Niagara Falls for power purposes. Therefore, private enterprise, which is ready and willing, should be allowed to do the job. Such is the gist of testimony supporting private development of this project submitted to the Committee on Public Works of the U. S. Senate. Speaking for the New York electric companies, Earle J. Machold presented a clear and concise statement of the bare bone facts relating to this project.

Machold pointed out that redevelopment of Niagara Falls, "involves no public function of government, state or federal, and would place government purely and simply in the power business."

The New York companies under the leadership of Earle Machold are to be congratulated on their willingness to organize themselves to finance and build this $300 million project. Obviously a million-kilowatt project is not too big for the interconnected systems of New York State. But, heretofore, the organizing genius for such a project has been lacking.

Now this first important step has been taken to keep government power out of New York. The electrical industry and the thinking people in New York State will be looking to Machold and his group for continued leadership in this field.

Speaking Openly and Frankly

Pres Charles E. Wilson of General Motors has performed an outstanding service to American industry. He has spoken out publicly in the Aug. 30 "Wall Street Journal" on the subject of wages, unions, and labor relations in general.

One of his conclusions, that cost-of-living provisions in wage contracts are not in themselves inflationary, is a constructive as well as an interesting contribution to current thinking.

Since the government has now sponsored this type of pay adjustment and made it another contribution to the growing inflexibility of the wage structure, it is important that this theory be openly debated by industrial executives.

But even more important than Wilson's opinions on the subject of wages and unions is his willingness to speak out publicly on this question. Just think how important it is to the 450,000 General Motors employees to know where their president stands. Similarly, those with opinions opposing the Detroit executive's should make their ideas known.

In dealing with labor, utility executives have been wise and generous. They have long recognized the importance of raising wages at least proportionate to the cost of living. Now is an appropriate time for utility executives to take appropriate credit for their foresight in the matter of keeping wages and salaries in line with the consumer price index.

The Electrical Week

INDUSTRY MOBILIZATION (Page 111)—Manufacturers voice violent protests against their fourth quarter allotments . . . Utilization and Conservation Branch is activated by Defense Electric Power Administration . . . 1952 first quarter allotments will be announced Oct. 8 . . . National Production Authority has drawn up new specifications to conserve nickel used in heat exchanger tubing . . . General Services Administration will buy chrome ore and concentrates to stimulate domestic production.

WASHINGTON—President Truman decides to seek an 80-day injunction under the Taft-Hartley Act to end the nationwide copper strike (p 106) . . . Putting home lighting on an engineering basis was among topics discussed at National Technical Conference of Illuminating Engineering Society (p 107) . . . Bureau of Reclamation set a new generation record during the 12 months ended June 30 (p 109) . . . Maj Gen George J. Nold named chairman of Army Engineers' Board of Rivers and Harbors (p 110) . . . FPC releases changes in capacity during July (p 110).

ELSEWHERE—Detroit Edison Co can lay claim to the title, "Powerhouse of Democracy" (p 104) . . . Tide Water Power Co shelves plans for a $23 million generating plant; its president denies a rumor that the company will be sold (p 108).

• • •

Latest from Washington—Government gets temporary restraining order from U. S. District Court in Denver, Colo., to halt copper strike . . . Because of strike, NPA puts super priority on copper to cover all military and AEC orders first . . . Keep your ears open for the possible announcement of the continuation of Daylight Saving Time.

American Power & Light petitions SEC to force Electric Bond & Share to dispose of its 7.81% holdings of American P&L capital stock within 30 days. The petition charges Bond & Share is trying to block "advantageous sale" of Washington Water Power by American to public power groups and is acting in the interest of its subsidiary, Ebasco Services. Ebasco has "huge profitable" construction contracts with Northwest utilities that oppose the sale, AP&L's Pres Howard Aller reveals . . . Niagara Mohawk Power Corp gets N. Y. PSC approval to up rates $2,750,000 a year to 27 large industrial customers in Niagara Falls.

Central Vermont Public Service Corp puts its first 6,000-kw gas turbine on the line, second is under construction, and third will be installed in first half of 1952. Total estimated cost is $3.6 million.

If BLS index hits 190.0 in December, wages will jump another 5% over last January, McGraw-Hill Washington bureau estimates. By industries, workers may get: construction, 10.6¢ per hour; soft coal and oil refining, 10.1¢; steel, 9.4¢; electric utilities, 8.5¢; aluminum and metal mining, 8.4¢; and electrical machinery, 7.7¢.

South Carolina Electric & Gas Co plans to spend $75 million in next eight years, largely in new steam plant (150,000-kw initial capacity and 300,000-kw ultimate) for western part of its service area, Pres S. C. McMeekin says. Plant will probably be in the vicinity of Aiken, where H-bomb plant is being built.

Latest from West Coast—Richard L. Boke, Reclamation regional director at Sacramento, resigns to take State Department post at Baghdad, Iraq . . . Central Arizona L&P asks State Corporation Commission for electric and gas rate increases averaging 12½%.

Charles A. Jinker (Greenburg, Pa.), who helped build the world's 18 largest waterwheel generators for Grand Coulee Dam, will represent Westinghouse Electric when the 18th generator is put into operation at ceremonies tentatively scheduled by the Bureau of Reclamation for Sept. 14 at Coulee Dam, Wash.

Ohio Power Co files court suit in an effort to settle a boundary line dispute in which Morgan and Washington Counties both claim the site of its new $40 million plant, 5 miles up Muskingum River from Beverly and Waterford, Ohio. Each county wants to collect taxes on the plant.

"There has been no slow down in the rate of incoming orders from industry and defense business continues to increase," Westinghouse Electric's Pres Gwilym A. Price reports. He expects third quarter business volume of Westinghouse to exceed record billings of $300.2 million reported in second quarter . . . AEC renews (to June 30, 1956) General Electric Co's contract to operate Hanford, Wash., works and Knolls atomic lab at Schenectady.

Congratulations—Empire District Electric Co elects Robert L. Kiddoo and Earl J. Drewelow vice presidents.

It Supplies the Arsenal of Democracy

And Since It Does, Detroit Edison Co Can Claim the Title, "Powerhouse of Democracy"—The Title Fits, More Ways Than One

If Detroit is the arsenal of democracy, as its boosters like to claim, Detroit Edison Co has all the license it needs to the title, "powerhouse of democracy."

In more ways than one the utility, headed by James W. Parker, is a powerhouse.

Capacity Being Expanded

1. It produces most of the power used by the many industries in the Detroit area.

2. It is expanding its capacity.

3. Unlike many companies whose sales are extremely heavy on the industrial side, it pushes residential and commercial sales with unabated vigor.

4. It believes that the industry must "stick together or be stuck." So Detroit Edison is an active participant in all programs of benefit to the industry.

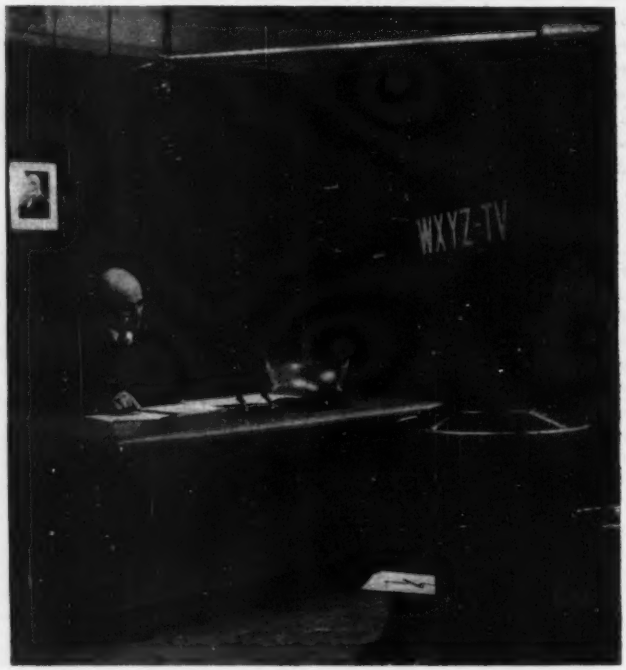
In 1950 Detroit Edison sold 7,309,183,027 kwhr of electric energy. Over 50% or 3,721,411,959 kwhr were sold to industrial customers. Commercial customers took 1,467,774,149 kwhr, residential and farm got 1,695,724,876 kwhr, and other customers (mostly municipals) took the remaining 424,272,043.

Industrial Sales Rise Seen

There were 513 industrial customers whose average purchase was 7,254,214 kwhr. Industrial sales this year will depend much upon the defense program. A long retooling period could cut these sales this year. But there is little doubt that by next year industrial sales will again be pushing upward. The only possible retardent might be lack of materials.

Total sales, however, are expected to increase. With this in mind the company is building a 375,000-kw plant on the St. Clair River, just north of Marine City. The St. Clair plant's three 125,000-kw units are all scheduled to get into operation some time in 1953.

The company's sixth steam plant, the River Rouge Plant, is to go on the line in 1954. This plant on the Detroit River, near the mouth of the Rouge, will have an approximate capacity of 125,000 kw. When all these plants are on the line, total capacity will be 2,207,850 kw—all but a trivial amount in steam plants.



JAMES W. PARKER, Detroit Edison president, appears on all-company meeting telecast to employees and public by a Detroit station. At this time he announced plans for building the River Rouge Plant and details of company's operations

Detroit Edison has the advantage of serving a small, closely knit, highly industrialized, and heavily populated area. This area is practically all within a radius of 50 miles of Detroit. But its population is 3,371,000, more than half the state. Since 1940 the population of the area has increased 25%, and most of the increase was in the Detroit metropolitan area.

Industrial growth has been responsible for the population increase. Detroit is now the third ranking industrial area in the nation. The number of production workers has increased 48% since 1939. What is more, non-automotive manufacturing is increasing faster than automotive. This is giving the area the industrial diversification that it needed.

The company, however, does not slight its commercial, farm, and residential customers. Aggressive selling keeps the load of these customers growing and their use of electricity increasing. An increase of about 1,700 commercial customers in 1950 brought the total to 98,895. Their average annual usage was 14,842 kwhr, 7.5% over 1949. Farm usage reached 3,600 kwhr, about 10% over 1949; residential and farm usage reached 1,992 kwhr or 8% more than 1949.

Home and farm usage was boosted by sales of major appliances. In 1950 installations on company lines included

about 36,000 ranges, 13,000 water heaters, 8,800 clothes driers, and 252,000 television receivers.

The company is also one of the few in the country which performs without charge such services as small appliance repairs, lamp exchanges, and initial supplies of new lamps. In 1950 over 500,000 appliances were repaired and over 11 million lamps exchanged.

Excels in Leadership

But it is in the field of industry leadership that Detroit Edison excels. President Parker is an earnest advocate of industry unity and cooperation. He is active in the affairs of the four big industry associations. He is a director of Edison Electric Institute, chairman of the steering committee of the Electrical Companies Public Information Program, a member of the finance advisory group and a solicitation captain of the Electric Companies Advertising Program, and a faithful participant in meetings of the National Association of Electric Companies.

This becomes more significant when one learns that Detroit Edison is solid in its territory and is not involved in any franchise or private-public power fights.

VP Expert on Supply Problem

Walker Cisler, executive vice president, has a national reputation for his work in the study of power supply problems. He has been chairman of the EEI Electric Power Survey Committee since its organization in 1946. He has also spent considerable time in Europe as a representative of the United States government. There he guided and directed the allied nations in reconstructing their war-torn power facilities. He was also on the staff of General Eisenhower during the war and was in charge of power problems.

Cisler is also the answer man for the "Question Box," a question and answer department which appears in the "Synchroscope," company house organ. The policy of frankness followed by this department is indicative of the company's open mindedness in dealing with its employees. The boldness of the questions is matched only by the courage with which they are answered by the vice president.

Davidson Report Urges Expanded NW Program

A report proposing a program of power development in the Pacific Northwest to be superimposed on the area's normal program has been released by C. Girard Davidson.

Davidson was assigned last year as special consultant to the Department of Interior to make a survey of the Pacific Northwest power situation. He submitted the report to Interior last February, but it has never been released by that department.

Davidson's program calls for an immediate phase and a second phase that would include starts on federal power projects designed to accelerate the program after four years.

Projects in the immediate phase that involve little or no controversy were steam plants at Coos Bay, Ore., and at Bremerton and Longview, Wash.; Pacific Power & Light's Yale Project on the Lewis River in southwestern Washington; and expansion of Rock Island Dam on the Columbia River. Immediate phase projects falling within a controversial classification included Tacoma City Light's Cowlitz River Project and Pelton Dam on the Deschutes River in Oregon, sponsored by Portland General Electric Co. The proposed Oregon-California intertie was also listed as a first-phase project falling within the controversial category.

Second phase projects listed as involving no serious controversies were The Dalles Dam, Corps of Engineers project on the Columbia, and Hells Canyon Dam on the Snake. Both dams have been approved by Congress, but no appropriations have been made for their construction.

A second phase project listed as strongly opposed by fishing interests was Ice Harbor Dam on the Snake a short distance above its confluence with the Columbia.

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Inventories Remain High on Radio, Television Sets

Despite the fact that dealer inventories on radio and television sets declined 15% during July, stocks in retail stores remained high in August, according to a survey conducted by Dun & Bradstreet, Inc.

Television sets held by dealers ranged between 900,000 and 1,150,000 at the beginning of last month, a sampling showed. This estimate included between 350,000 and 450,000 table models, and between 550,000 and 700,000 other models.

Retail inventories of new home radios were estimated to have ranged between 1.4 and 1.7 million units at the same time.

CLIFF EXCAVATION progresses at the site of Ontario's $157-million development on the lower Niagara River near Queenston. The 600,000-hp generating plant will be supplied by a 45-ft tunnel under Niagara Falls, Ont. (EW, May 14, p 11)

Truman Decides to Seek Injunction to Halt Nationwide Copper Strike

President Truman decided last week to seek an injunction under the Taft-Hartley Act to halt the nationwide copper strike after a board of inquiry reported the strike was exposing the country to grave danger.

The 80-day injunction would be against the International Union of Mine, Mill, and Smelter Workers, unaffiliated; several railroad brotherhoods, and several unions affiliated with the American Federation of Labor. These unions are on strike against Kennecott Copper Corp, Phelps-Dodge Corp, Anaconda Copper Mining Co, and American Smelting & Refining Co.

The board's report, Truman said, "indicates that certain of the disputes have been settled, but that others covering a substantial part of the industry are still unresolved."

The Mine, Mill, and Smelter Workers had reached agreement with Kennecott, leading copper producer. Strike leaders said they were ready to settle with the other companies on the same basis, but the other companies refused to go along with the Kennecott settlement. The Kennecott agreement called for a wage increase of 15¢ an hour and a pension plan valued at 4½¢ an hour.

An estimated 49,000 workers remained on strike despite the partial settlement.

Government agencies last week were still trying to assess the loss caused by the strike and discover just what readjustments could be made.

Although a firm policy still was not set, officials in National Production Authority's Copper Division believed no effort would be made to divert September copper shipments to priority customers. The idea was to let the September refined copper allotments stand, and losses from the strike fall where they would.

There was talk of withdrawing enough copper from the nation's strategic materials stockpile to cover the strike losses, but here again, a statement of policy was delayed. Officials estimated the strike was costing about 2,400 tons a day.

Nor was there any announced disposition to readjust fourth quarter allotments to make up for any third quarter losses caused by the strike. "We will have to face the losses at some point," an official said, indicating there would be no allotment carryovers from the third quarter.

However, NPA does have the authority to issue directives to supersede allotments to industry. If the strike continued for some time, observers believe NPA would have no alternative than to keep close tabs on the delivery of each carload of refined copper.

If the copper production losses are felt on an "across the board" basis, NPA's Electrical Equipment Division will be one of the first to feel the impact since it is the third largest distributor of copper allocations.

In a fact sheet issued at mid-week, Defense Production Administration said copper inventories were "virtually exhausted."

DPA concluded, "Further increases in the military requirements in the first quarter of 1952 can only mean that there will be less copper available for the production of consumer durable goods."

H-BOMB'S HOME TOWN near Aiken, S. C., will be source of a tremendous electrical load once the plant is built. Atomic Energy Commission last week refused to say whether contracts have been let. Here, guards check truck at project's gate

Ohio Power Co Strike Ends on Split 5% Offer

A company offer of a split 5% wage increase retroactive to October, 1950, brought settlement Aug. 30 of the month-long strike of 970 power plant and central division employees against Ohio Power Co.

The Utility Workers Union of America, CIO, representing the employees, signed a two-year contract with provision for wage reopenings next year. Provisions of the agreement included:

1. A 3% wage increase will be submitted to the Wage Stabilization Board for its approval. The remaining 2% will be submitted to WSB for decision as to whether it should be paid or not.

2. In addition, 680 power plant employees will receive an average increase of 22¢ an hour including a straight hourly increase, provisional increase under WSB formula, vacation adjustment, and adjustment of so-called job inequities.

3. Also, 290 Central Division employees will receive an average hourly increase of 20¢, including provisions outlined in the power plant offer. The 2¢ differential is in the job inequity portion of the "package."

The union had demanded a straight 5% wage increase, none of which would be subject to WSB decision. During the strike, supervisory employees of the company maintained service to all customers.

STURROCK, DUNN, HIBBEN

HARTENSTEIN, BRODE, CLARK

FREEMAN, TAYLER, GRATTON, CLARKSON

ATHERTON, McKINLEY, BROWN

IES LEADERS at recent meeting: Upper left, Walter Sturrock, president; R. Roy Dunn, president, Potomac Electric Power Co; Samuel G. Hibben, president-elect; upper right, R. F. Hartenstein, conference chairman; W. R. Brode, U. S. Bureau of Standards; George W. Clark, chairman, conference executive committee.

Lower left, D. C. Freeman, U. S. General Services Agency; Lee Tayler, Detroit Edison Co; Harry Gratton, Jr, Pepco; C. W. Clarkson, Corning Glass Works; lower right, C. A. Atherton, Westinghouse International; R. W. McKinley, Pittsburgh Corning; W. C. Brown, General Electric Co

Engineering Basis for Home Lighting Is among Topics Considered by IES

Recent efforts towards development of an engineering basis for applications of lighting in the home were given additional impetus at the National Technical Conference of the Illuminating Engineering Society in Washington, D. C., August 27-30.

In their paper offering a basis for predicting general room illumination, Priscilla Presbrey and Edith L. Buchholtz, both of Westinghouse Electric Corp, presented the first determinations yet made of utilization factors for fixture and lamp forms commonly used in the home. Along the same line of engineering development was the paper on designs for lighting education in home economics colleges by Kaye Leighton, General Electric Co.

Present-day recommendations of lighting intensities for industrial seeing tasks may be considerably under optimums that future research will disclose. This possibility was contained in a study reported by Willard Alphin, Sylvania Electric Products Corp. By means of muscle voltages measured in the forehead of an operator on very fine work, the energy expended in seeing was recorded. It indicated that for this kind of work, not uncommon in manufacturing, a light intensity of 1200 ft-c was required for optimum illumination of the task.

A new, compact, highly portable telescope visibility instrument for street lighting and other evaluations was described by G. A. Horton of Westinghouse. He said it requires no electrical supply, is easy to operate, and may be used to measure visibility conditions in inclement weather.

L. M. Endres of the Buildings Management Division of General Services Administration, Washington, D. C., said tests indicated that the efficiency of the lighting in an office increased from 9 to 25% by painting,

cleaning of fixtures, and replacement of lamps and floor covering.

Pilots in red-lighted cockpits of military aircraft spotted targets more than twice as surely as those who used ultra-violet cockpit lighting, according to Fred R. Brown and David Alsher of the Navy's Air Experimental Station at the Philadelphia Naval Base.

The present cost of Kansas City's modern street lighting equipment is $12.80 per thousand effective lumens per year as compared with $47.50 per thousand for electric and $135.00 per thousand for gas with the old style equipment, according to T. J. Seburn, City Traffic Engineer, Kansas City, Mo.

The new magnesium fluorogermanate phosphor has made possible for the first time a new line of practical color-corrected mercury lamps which will greatly widen the acceptance of mercury vapor lighting, in the opinion of H. D. Fraser and W. S. Till of Westinghouse. New developments such as improved sealing methods, large arc tubes and larger outer bulbs of lime glass have made quartz mercury lamps increasingly desirable for industrial, flood, and street lighting, they said.

In a joint paper on fundamentals of lighting cost analysis, A. C. Barr and C. L. Amick, General Electric, pointed out that such compilations exclude consideration of quality of illumination which is incapable of numerical statement. A later paper by Fred J. Vorlander, Champion Lamp Works, reported on a study of group replacement of lamps in industrial service based on number of lamp failures instead of burning hours. By both methods the most economical replacement time figures out to approximately 80% rated life. In discussing this paper, Mr. Barr remarked that if illumination quality could be taken into account the replacement period would be reduced, perhaps even to as low as 50% of rated life.

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Electrical Living Show

Chicago Electric Association will cooperate this year with Chicago Metropolitan Home Builders Association in the Modern Living Exposition, formerly called the Home Show, at Navy Pier, Sept. 22 to Sept. 30. The Electric Association will manage the show's Electric Living section.

Tide Water Shelves Building Plans; President Bell Denies Sale Rumor

Plans for immediate construction of a $23 million generating plant in Wilmington, N. C., by Tide Water Power Co have been temporarily suspended, Warren W. Bell, president, has announced.

Construction material shortages and previous power purchase commitments were given by Bell as the reasons for postponement of the plant. Tide Water is negotiating with Carolina Power & Light Co for additional power and that company has already made extra investment to supply the power.

Postponement of expansion plans was not attributed to any rumor that the company would be sold. Bell has denied a persistent rumor that Tide Water would be sold to Carolina Power & Light Co.

"We have no intention of selling Tide Water," he said recently. "Certainly Tide Water would be an attractive acquisition for any power company. During recent years we have taken a power company that none of our neighbors wanted and have built it into a substantial operation in an area that shows more future promise than any other spot I can think of in the East."

Because of the postponed expansion plans the North Carolina Utilities Commission has announced it would look into Tide Water's situation. The commission feels the utility has not done all it said it would when granted a rate increase two years ago.

Bell has informed Stanley Winborne, chairman of the commission, that his company has the money to make the improvements and provide better service, but that Tide Water just cannot get needed materials because of a lack of priorities.

Tide Water serves 16 southeastern North Carolina counties.

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30-Year Franchise OK'd

A 30-year franchise has been granted to the Central Power & Light Co, Corpus Christi, Tex, by the Ingleside City Commission.

C. F. (CHECK) BENNETT, inventor of the Oilostatic cable, shown as he turned over his job as manager of Okonite Co's Oilostatic Department to two successors, G. N. Everett, Oilostatic engineer, and P. V. White, new administrative manager. Bennett, who retired after 21 years with Okonite, will continue as consultant to the company

Production Record Is Set by Reclamation Projects

Bureau of Reclamation dams turned out 21,265,358,201 kwhr during the 12 months ended June 30. This was the highest USBR output on record—7% above the previous year.

Sale of energy brought in more than $35 million, the bureau reported.

Installed generating capacity of plants under the Reclamation program increased nearly 25% during the year, to provide an additional 750,000 kw. This brought total capacity of the projects to 3,939,500 kw.

Increased capacity came from five new generators at Davis Dam (Nev.-Ariz.) on the Colorado River, four Grand Coulee (Wash.) generators, and power plants in Wyoming, Idaho, and Colorado. Three more generators are scheduled to be installed by the bureau at Hoover Dam within the next 12 months.

By 1954 the bureau expects to have increased its capacity in the western states and Alaska by still another 680,000 kw from plants now under construction.

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Los Angeles Utility Uses PTM Microwave System

The Department of Water & Power of the City of Los Angeles, now has in service a Pulse Time Modulation microwave radio relay system which links its main office in Los Angeles with a steam generating station at Seal Beach, a distance of 22 miles.

The system is equipped for operation on five voice channels and one telegraph channel with provision for dispatching, telemetering, and supervisory services. Operating at 2,000 megacycles, the equipment allows the use of simple coaxial transmission lines.

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PSC Chairman Resigns

Owen Clarke, chairman of the Washington State Public Service Commission, has resigned to return to private law practice in Yakima, Gov Arthur Langlie has announced. The Governor named E. W. Anderson, a member of the State Tax Commission, to fill the vacancy. Jerome Kuykendall, a PSC member, will become chairman.

MOUNTAIN ROADS, 500 miles of them, must be built to aid construction of Australia's Snowy Mountains Hydro Project. Bulldozer works above Munyang Camp

Snowpower in the Australian Alps

Melting snow from the Kosciusko area of the Australian Alps will provide the subcontinent with 2,750,000 kw of power when the Australian government's vast Snowy Mountains Hydro-Electric Project is completed. Work on the project, which will take 25 years to finish, has begun in earnest.

Seven major dams and 84 miles of under-mountain tunnels will be built to impound a total of 2,250,000 acre-ft of water for the power-irrigation development. More than 500 miles of race lines will be dug to divert melting snows into the main channels.

The plan entails diverting some of the flow of the Snowy River into the Murray River and some of the flow of the Eucumbene River into the Murrumbidgee River.

To make use of this water potential, 16 power stations will be built, many of them hundreds of feet underground.

Two existing townships will be inundated, and many subsidiary towns will be constructed to accommodate the army of workers engaged. The whole work is estimated to cost $448 million.

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EEI Survey Completed

The Edison Electric Institute's Residential Lighting Committee has completed a survey of electric company home lighting practice. The survey reveals that of the 91 electric utility companies which replied, 54 are actively promoting home lighting. An additional 11 companies plan to begin promotion in the market this year. The companies which supplied data for the survey serve 19,437,620 residential customers, representing about one-half the industry's total.

Changes in Capacity Reported to Federal Power Commission

PLANT ADDITIONS DURING JULY

State	Utility	Plant	Fuel	Capacity (Kw)
Ky.	Kentucky Utilities Co	Pineville	S	30,000
Tex.	Austin Water, Light & Power Department	Austin	S	20,000
Idaho	Bureau of Reclamation	Anderson Ranch	H	13,500
Colo.	Bureau of Reclamation	Marys Lake	H	8,100
Ore.	California Oregon Power Co	Slide Creek	H	18,000
Calif.	Southern California Edison Co	Big Creek 4	H	42,000
N. J.	Public Service Electric & Gas Co	Sewaren	S	125,000
Ohio	Cleveland Electric Illuminating Co	Lake Shore	S	60,000
Wis.	Wisconsin Power & Light Co	Edgewater	S	60,000
Minn.	Northern States Power Co	Mobile Unit	IC	175
Neb.	Omaha Public Power District	Jones Street	S	40,000
Neb.	Falls City Water & Light Department	Falls City	IC	1,984

PLANT RETIREMENTS DURING JULY

N. H.	Greenville Electric Lighting Co	Greenville	H	200
Mass.	Beverly Gas & Electric Co	Beverly	S	1,500
N. Y.	Rochester Gas & Electric Corp	Rochester	H	320
Pa.	Weatherly Borough Light & Power Department	Weatherly	S	200
Pa.	West Penn Power Co	Bellefonte	H	250
Ind.	Citizens Heat, Light & Power Co	Winchester	IC	880
Mich.	Fruit Belt Electric Cooperative	Casopolis	IC	2,375
Mo.	Missouri Power & Light Co	Clarence	IC	108
Tex.	Texas Power & Light Co	Tyler	IC	600
Ariz.	Arizona Edison Co	Coolidge	C	450

H—Hydro, IC—Internal Combustion, S—Steam
United States Capacity as of August 1—Hydro, 18,513,561 kw; Internal Combustion, 1,940,814 kw; Steam, 52,249,775 kw; Total, 72,704,150 kw.

Manufacturers Will Get AEC Course Graduates

Five recent graduates from the Atomic Energy Commission's Oak Ridge School of Reactor Technology will apply their training to problems of electrical equipment manufacturers.

General Electric Co and Westinghouse Electric Corp will get five of the first 46 students, engineers, and scientists to complete the course at Oak Ridge. Half the class came from industry ranks and half were selected college graduates who will now join industrial companies or government organizations.

Set up in 1950 to develop a new source of experienced technical personnel for the AEC's Reactor Development Program, the school offers classified training which cannot be given in universities.

A new class of about 70 students—30 from industry and 40 from colleges—will begin the 1951-52 term this month.

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Michigan Utility Reveals Power Expansion Plans

Consumers Power Co (Mich.) has announced generating capacity expansion for its new Justin R. Whiting Plant on Lake Erie between Monroe and Toledo and the John C. Weadock Plant on Saginaw Bay at the mouth of Saginaw River.

Scheduled for completion in 1953, the new Whiting Plant will have a total capacity of 276,000 kw. Two units are expected to be operating in 1952; the third is scheduled for 1953. The company has placed an order for a seventh generating unit to be installed in the Weadock Plant, which will more than double that of any unit now in Consumers' system. The 135,000-kw unit will bring the plant's total capacity to 425,000 kw.

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Nold Is Head of Army's Rivers and Harbors Board

Maj Gen George J. Nold, deputy chief of the Corps of Engineers, is the new chairman of the Board for Rivers and Harbors succeeding Maj Gen John S. Bragdon, who retired several months ago after 36 years of service in the corps.

Nold's new duties will be in addition to the ones he now has as deputy chief. The board, consisting of seven senior engineer officers, reviews all reports to Congress on river, harbor, flood control, and multiple-purpose projects of the corps.

Col William E. Potter leaves his position as assistant chief of engineers for special projects to become a student at the National War College. From 1949 to February, 1951, Potter was acting assistant chief of engineers for civil works.

New TVA Line Prevents a Serious Power Failure

A Tennessee Valley Authority transmission line between Hickory Valley, Tenn., and Holly Springs, Miss., was installed just in time to prevent a severe power interruption in the Holly Springs area.

Six days after the 44-kv line was put in operation, lightning struck the Tupelo-New Albany Line — sole source of power for the area. With its new line, TVA was able to carry the full loads of Holly Springs and Tippah Electric Power Association and most of the load at New Albany, Tenn.

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BEA Has Permit to Build 480,000-Kw Steam Plant

British Electricity Authority has received permission from the Minister of Fuel and Power to build a 480,000-kw steam plant at Marchwood near Southampton.

The station will have eight 60,000-kw turbo-generators and eight boilers with an evaporating capacity of 550,000 lb of steam per hour.

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New High-Voltage Lab

Cornell University, Ithaca, N. Y., plans to build a new high-voltage laboratory to replace one destroyed by fire in February, 1948. The building is expected to be ready for use within a year.

Tough Decision

When the Chelan County PUD of Wenatchee, Wash., was buying a conductor for a transmission line from the Rock Island hydroelectric plant of Puget Sound Power & Light Co, it didn't have much trouble selecting the type of conductor or the contractor to furnish it.

Chelan decided on aluminum and awarded a $20,300 contract to Aluminum Co of America, whose new aluminum reduction plant nearby will get most of the power from the expanded power plant. Six new generators will be installed in the hydro plant under an arrangement between the PUD and the power company.

Violent Protests Against 4th Quarter Allotments Voiced by Manufacturers

Fourth quarter material allotments, if allowed to remain as they are, will play havoc with delivery schedules of the electrical equipment industry, it was confidently predicted last week.

No sooner had the allotments been sent out to manufacturers than a violent wave of protest rebounded on the Electrical Equipment Division of National Production Authority.

Wave of Protests

Among the protests:

1. Manufacturer of high-voltage transformers telephoned in to inquire: "Which one of the Atomic Energy Commission orders do you want me to take out of my schedule?"

2. A medium-sized company, manufacturing a transformer item for its own use, called in to say the reduced allotment would mean it would have to lay off 250 workers during the fourth quarter.

3. A switching equipment company of many years experience said its carbon steel allotment would barely fill one military order now scheduled for early delivery. Following that, the company said, it would be forced to shut down until more materials become available.

4. The official of a small equipment manufacturing company reported his fourth quarter allotment is so small it will not cover third quarter wire orders which have been delayed at the mill.

Appeal Gets Nowhere

5. A transformer manufacturer flew to Washington immediately upon receiving the fourth quarter allotment to appeal for more material, but got nowhere. He reported he had already defaulted on one military contract because of his inability to place orders on his third quarter allotment.

These are a few typical cases. EED estimated that complaints have been received from more than half of the manufacturers who had received their fourth quarter allotments.

It was evident that the allotments for the fourth quarter were causing a greater furor than did those for the third quarter. EED has estimated that fourth quarter allotments averaged 30% less than those for the third.

Besides the quantity cutback, there are other factors that have delayed the showdown until now. For one thing, manufacturers have, up until now, had some inventory to draw from. That is exhausted in many cases. Secondly, vacations scheduled during the third quarter slowed production—made materials last longer. Third, mills were allowed to carry over orders delayed in the second quarter and deliver them in the third. There is an express prohibition against this carryover into the fourth quarter.

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Conservation Branch Is Activated by Depa

With an eye to the prospect of a tight power supply in at least two regions during the peak-use month this winter, Defense Electric Power Administration has activated its "Utilization and Conservation Branch."

Johann M. Gumz, on leave from Pacific Gas & Electric Co, will be chief of the branch. A native of Illinois, Gumz has been with PG&E for many years, and is now manager of commercial and industrial sales.

Duty of the newly activated branch will be to keep in touch with the power situation in the various regions and localities to determine where deficiencies may develop and what steps are necessary to alleviate the deficiency.

Further, the branch is to carry out programs for the reduction of nonessential uses of power and for allocation of power among various types of users in the areas of tight supply.

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1952 1st Q Allotments to Be Announced Oct. 8

Target date for announcing first quarter 1952 allotments is Oct. 8. The two electrical divisions in the National Production Authority began discussions Sept. 7 with members of the program requirements committee. Defense Electric Power Administration has concluded this phase.

Next step for the NPA divisions is to put their case before a meeting of the joint metals committee Sept. 14. Appeals will be heard by the production executive committee Sept. 26 through Oct. 1.

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NPA Plans to Conserve Nickel in Boiler Tubing

New specifications have been drawn up for the use of heat exchanger tubing to save critical nickel.

Already approved by National Production Authority, the specifications are still subject to acceptance by the boiler code committee of the American Society of Mechanical Engineers.

Defense Electric Power Administration has set up a method for arriving at the proper tube alloys for various design conditions in the electric power industry. This method, explained in a recent letter to utilities, conforms with the new specifications.

The idea is to reduce the nickel ratio in the cupro-nickel alloy used for the tubing to the minimum consistent with sound engineering standards and efficiency.

One NPA agency proposed that the nickel content in the alloy be limited to 10%, but this was rejected by manufacturers who argued such an alloy cannot be substituted indiscriminately for the higher nickel content alloys.

Manufacturers will require three to four months to convert tube metals on existing contracts to lower nickel-content alloys, but Depa hopes delivery of tubing will not be slowed down by the changeover.

Utilities were told to indicate the maximum pressure of both the tube side design and shell design in ordering such tubing.

Depa said it would attempt to obtain exemptions from the conservation measure in cases where it would cause delays in tubing delivery and set back in-service dates of power plants.

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GSA Plans to Buy Chrome

General Services Administration will buy chrome ore and concentrates in a program designed to stimulate domestic production. The government offer to buy will extend to June 30, 1953, or until 200,000 tons have been accepted.

YIELDS (%) — Operating Electric Utility Securities

Quality	Bonds 1st	Bonds 2nd	Bonds 3rd	Preferred Stocks 1st	Preferred Stocks 2nd	Preferred Stocks 3rd	Common Stocks 1st	Common Stocks 2nd	Common Stocks 3rd
DATE									
1951									
Aug. 30	2.85	2.89	3.05	4.07	4.24	4.59	5.53	6.14	7.03
Aug. 23	2.87	2.92	3.07	4.06	4.25	4.60	5.55	6.17	7.06
END OF QTR.									
2nd 1951	3.02	3.11	3.23	4.11	4.37	4.68	5.73	6.38	7.37
1st 1951	2.27	2.93	3.00	3.96	4.19	4.52	5.47	6.20	7.13
4th 1950	2.65	2.67	2.78	3.86	4.14	4.51	5.80	6.54	7.44
3rd 1950	2.66	2.67	2.76	3.81	4.08	4.46	5.70	6.54	7.25

Data: Reis & Chandler, Inc.

South Carolina E&G Asks for 6% Increase in Rates

South Carolina Electric & Gas Co has asked the State Public Service Commission for an average rate increase of 6% to yield an estimated $1.3 million in extra revenue. The increase would affect 22 counties in South Carolina served by the utility.

The boost in electric rates would hit industrial users hardest according to South Carolina E&G's president, S. C. McMeekin. The increase in any average residential bill would not exceed 38¢ a month in the company's Columbia division and 61¢ a month in the Charleston division.

McMeekin said the rate increase request had been made necessary by higher costs of materials and labor and higher taxes. Net earnings of the utility have dwindled to such a point that even with the proposed increase the company would have a return of less than 5% on its investment, he declared.

In another rate case, the Pennsylvania Public Utility Commission issued a final order late last month cutting to $3,450,000 an electric rate increase of $7,697,000 which Duquesne Light Co put into effect Jan. 10. The January boost became effective automatically, subject to final PUC order. The company has been ordered to make appropriate refunds with interest.

Pennsylvania Electric Co has filed a new rate schedule with the PUC to equalize rates paid by residential customers effective after Oct. 29. The company has declared that the new rate schedule is not designed to increase revenue but to equalize rates paid by 280,000 customers in 24 counties in western and south central Pennsylvania. Bills for some customers will be decreased while some bills will be increased slightly. Seven rates now in existence will be eliminated.

In Canada, British Columbia Electric Co has submitted a "cost of money study" to the British Columbia Public Utilities Commission in support of an application for an allowed return of not less than 7.5% in place of the present allowed return of 5.8% on the depreciated rate base.

FINANCIAL BRIEFS

Securities and Exchange Commission has scheduled for Sept. 20 oral argument in the American Power & Light Co proceedings.

Senate Finance Committee has approved 10% excise taxes, voted by the House committee, on clothes driers, dishwashers, mangles, and 11 other types of household appliances. In addition it added vacuum cleaners, washing machines, and disposal units to the appliance list. Tax yield would total $73 million. The Senate committee accepted the House provision for repealing the 3¼% electric energy tax.

Consolidated Edison Co of New York's ban on residential submetering scheduled to go into effect Aug. 31 has been postponed as a result of a court injunction issued Aug. 30. The injunction restrains the utility from putting into effect a Public Service Commission order to end submetering pending a hearing of court appeal of the order. Earlier the PSC had denied a petition for a rehearing. (EW, Sept. 3, p 20).

Voters in Wasco County, Ore., would be asked to decide at an October election whether Northern Wasco PUD should buy out its competitor, Pacific Power & Light Co, or dissolve the district, according to a proposal by the district's president. No action on the proposal has been taken yet . . . **Eugene (Ore.) Water & Electric board** has offered to buy a portion of Mountain States Power Co's distribution facilities north and northeast of Eugene.

Indianapolis Power & Light Co has declared a common stock dividend of 50c, payable Oct. 15. Dividend for previous quarters has been 45c . . . **Tucson Gas, Electric Light & Power Co** will pay a common dividend of 40c on Sept. 22, compared with 35c in prior quarters.

Electric Utility Financing

Company	Description	Amount of Offering (000)	Offering Price	Yield at Price to Public
	WEEK OF AUGUST 29-SEPTEMBER 5			
Bonds				
Columbus & Southern Ohio Electric	1st mtg, 3¼%, 1981 new money	$12,000	102.4222%	3.125%
	SCHEDULED FOR SEPTEMBER 5-12			
Bonds				
Alabama Power	1st mtg, 1981	$15,000	.....	.....
	SCHEDULED FOR SEPTEMBER-OCTOBER			
Bonds				
New England Gas & Electric Association	coll tr, 1971	$6,115	Bid Date Sept. 18	.....
Arkansas Power & Light	1st mtg	8,000	Oct. 9	.....
Pennsylvania Electric	1st mtg	5,000	Oct. 9	.....
Utah Power & Light	1st mtg	9,000	Oct. 29	.....
Preferred Stock				
Pennsylvania Electric	30,000 sh	3,000	Oct. 9	.....
Common Stock				
Utah Power & Light	175,000 sh	.....	Sept. 19	.....
Pennsylvania Power & Light	542,484 sh (1-for-7, record Sept. 18)	.....	Oct. 3 (expiration date)	
Consumers Power	561,517 sh (1-for-10, record Oct. 17)	.....	Nov. 2 (expiration date)	

Low Water Shuts Down Elephant Butte Station

Low water shut down Reclamation's Elephant Butte hydroelectric plant at El Paso, Tex., as the reservoir behind the dam dropped to an all-time low of 28,200 acre-ft.

Total storage, including Caballo Reservoir, was 47,000 acre-ft. The plant is rated at 27,000 kva.

Reclamation is continuing to supply power to its ten wholesale customers by drawing on the local power pool.

New Franchise Voted

Miami Springs has voted Florida Power & Light Co a new 30-year franchise.

MEETINGS

Northern California Electrical Bureau
Annual Exposition Civic Auditorium, San Francisco, September 7-14.

Rocky Mountain Electrical League
Fall Convention, La Fonda Hotel, Santa Fe, N. M., September 9-12.

Edison Electric Institute
Commercial Cooking Committee, EEI Headquarters, 420 Lexington Ave., New York, September 10-11; Prime Movers Committee, Statler Hotel, Buffalo, N. Y., October 1-2; Meter Service Committee, Purdue University, Lafayette, Ind., October 1-3; Electrical Equipment Committee, New Ocean House, Swampscott, Mass., October 8-9; Transmission-Distribution Committee, Sheraton Hotel, Rochester, N. Y., October 10-11.

Instrument Society of America
National Instrument Conference-Exhibit, Sam Houston Coliseum, Houston, Tex., September 10-14.

Northwest Public Power Association
Joint Meeting with Montana REA Association, Hotel Florence, Missoula, Mont., September 12-14.

Michigan Municipal Utilities Association
Annual Meeting, Plankinton House, Milwaukee, Wis., September 13-14.

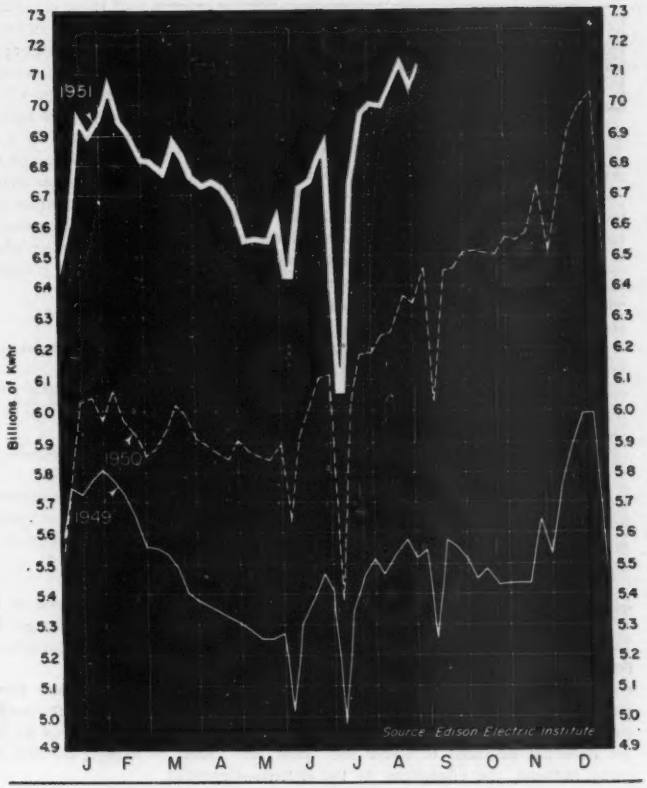
International Association of Electrical Inspectors
Southwestern Section, Hotel Lafayette, Long Beach, Calif., September 13-15; Northwestern Section, Hotel Davenport, Spokane, Wash., September 19-21; Western Section, Hotel Fontenelle, Omaha, Neb., September 25-27; Eastern Section, Hotel Claridge, Atlantic City, N. J., October 1-3; Southern Section, Hotel John Marshall, Richmond, Va., October 15-17.

Pennsylvania Electric Association
Annual Meeting, Benjamin Franklin Hotel, Philadelphia, September 18-19; Transmission-Distribution Committee, Hotel Concord, Northeast, Pa., October 11-12; Hydraulic Power Committee, Irem Temple Club, Dallas, Pa., October 11-12; Joint Relay-Communications Committee, Emerson Hotel, Baltimore, Md., October 18-19; Electrical Equipment Committee, Penn Alto Hotel, Altoona, Pa., October 22-23; Meter Committee, Arlington Hotel, Oil City, Pa., October 25-26.

Public Information Program
Annual Workshop Conference, Edegwater Beach Hotel, Chicago, September 20-21.

Wisconsin Utilities Association
Accounting Section, Plankinton House, Milwaukee, Wis., September 20-21.

Public Utilities Association of the Virginias
Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., September 21-22.



Output Week Ended Sept. 1—7,145,609,000 Kwhr

Weekly Output, Millions Kwhr						Percent Change from Previous Year		
1951		1950		1949			Sept 1	Aug 25	Aug 18
Sept 1	7,146	Sept 2	6,459	Sept 3	5,544	New England	+ 3.1	+ 2.7	+ 5.0
Aug 25	7,077	Aug 26	6,346	Aug 27	5,523	Mid-Atlantic	+ 6.3	+10.1	+13.0
Aug 18	7,164	Aug 17	6,370	Aug 16	5,579	Central Industrial	+ 7.7	+ 7.7	+ 8.4
Aug 11	7,070	Aug 12	6,253	Aug 13	5,530	West Central	+15.1	+10.3	+ 9.8
Aug 4	7,003	Aug 5	6,247	Aug 6	5,466	Southeast	+11.7	+11.2	+12.2
July 28	7,005	July 29	6,190	July 30	5,518	South Central	+36.1	+32.9	+29.3
July 21	6,975	July 22	6,186	July 23	5,462	Rocky Mountain	— 5.6	+ 8.9	+ 8.6
July 14	6,739	July 15	6,006	July 16	5,342	Pacific Coast	+13.3	+13.7	+14.7
July 7	6,077	July 8	5,380	July 9	4,982				
June 30	6,898	July 1	6,115	July 2	5,410	Total United States	+10.6	+11.5	+12.8

American Society of Mechanical Engineers
Fall Meeting, Hotel Radisson, Minneapolis, Minn., September 25-28.

Iowa Utilities Association
Management Conference, Fort Des Moines Hotel, Des Moines, Iowa, October 1-2.

Southeastern Electric Exchange
Engineering-Operation Section Conference, John Marshall Hotel, Richmond, Va., October 4-5; Sales Conference, Roosevelt Hotel, New Orleans, La., October 31, November 1-2.

National Farm Electrification Conference
Annual Meeting, Hotel Gibson, Cincinnati, October 9-10.

National Electrical Contractors Association
Annual Convention, Shoreham Hotel, Washington, D. C., October 8-12.

Indiana Electric Association
Annual Convention, French Lick Springs Hotel, French Lick, Ind., October 10-12.

International Association of Electrical Leagues
Annual Conference, Roosevelt Hotel, New Orleans, October 10-13.

Association of Edison Illuminating Companies
Annual Meeting, The Greenbrier, White Sulphur Springs, W. Va., October 11-13.

National Association of Railroad and Utilities Commissioners
Francis Marion Hotel, Charleston, S. C., October 16-19.

Public Utilities Advertising Association
Hotel Cleveland, Cleveland, Ohio, October 18-19.

National Association of Corrosion Engineers
South Central Region Meeting, Robert Driscoll Hotel, Corpus Christi, Tex., October 18-20.

National Electronics Conference
Annual Conference, Edgewater Beach Hotel, Chicago, October 22-24.

American Institute of Electrical Engineers
Fall General Meeting, Hotel Cleveland, Cleveland, Ohio, October 22-26.

American Standards Association
Annual Meeting, Waldorf-Astoria, New York, October 22-24.

WASHINGTON COMMENT

JESSE MOCK

With its own defense goal to meet, why is the electric power industry caught in the materials squeeze?

For an answer, it is necessary to understand the ruthlessness with which the "guns and butter" philosophy is being applied by top control agencies in Washington.

The philosophy is that the American economy can be expanded to produce the defense needs of the country without substantially interfering with the lines of durable goods coming off assembly lines.

In allocating materials for these purposes, top controllers first make sure that direct defense needs are adequately cared for. In practice, this means providing enough materials for the armament makers, airplane manufacturers, and the atomic energy plants. This supposedly takes care of the "guns" segment of the philosophy.

To take care of the "butter," the controllers provide substantial materials for the production of automobiles, household appliances, and other durable goods. Labor groups, as well as consumers, manufacturers, and retailers make such allotments politically feasible, to say the least.

The Industry Is Between "Guns" and "Butter"

In between these two factions come the defense-supporting industries—which do not have a clearly defined niche under either the "guns" or "butter" demands for materials. These industries include electric power, natural gas pipelines, municipal water suppliers, and the like. As the materials demands of either the "guns" or "butter" group increase, the allocations to the defense-supporting industries decrease, and vice versa.

Against this background, it becomes a little easier to understand the crimp being put into the electric utilities expansion program.

Officials in the claimant agencies for the electric power industry face a constant fight to establish a niche in this over-simplified, patriotic-political philosophy of the moment. The top men who deal out the materials are not experts in the electric power field. They are laymen, who have seen only the exteriors of power plants. Their most personal experience with electricity comes when they switch on the lights.

Claimant Agencies Doing Their Best

The claimant agencies for the industry are carrying on an educational program to gain an understanding of its material needs. They are using modern methods, including movies, brochures, and brief letters. But all this takes time. If the emergency lasts long enough, the top control men will have a pretty good background as to the needs of the industry and an appreciation for its work. Until the educational program begins taking effect—the claimant agencies cannot expect to turn the tide.

In the meantime, relatively small incidents assume a tremendous significance in the continuing battle. For instance, at a showdown meeting with a materials requirement committee a few weeks ago, a spokesman for one of these claimant agencies was doing his best to convince the group of his need for a larger share of fourth-quarter materials. It appeared his argument was hitting home.

Then, a committee member reached down in his brief case and brought out a full-page newspaper advertisement pushing the sales of household electrical appliances. It was sponsored by a utility company.

The question was obvious: "Why were utilities demanding a larger share of critical materials for plant additions and operations at the same time they are pushing the sale of 'butter' items for all they are worth?"

No matter what was the real significance of the incident, it cut the ground from under the claimant agency for the moment.

TECHNICAL NOTES

ARCHER E. KNOWLTON

Millimeter waves longer than infrared but shorter than the electromagnetic are hard to produce and hard to detect and measure; consequently, there have been few applications.

Polyethylene as a protection against weathering of wire will have longer life if it has 1% of channel carbon black having a particle size below 25 mμ.

Temperature rise of windings in alternators during sustained faults may be 60% higher in hydrogen-cooled machines than in air-cooled machines because the current loading per inch of rotor periphery in the former is higher.

Manual clearing of 3-phase faults may be risked but the recommendation is for automatic clearing of line-to-line faults if safety of generator windings is desired.

Pumped-storage plants in Germany operate with an efficiency of 63.5% after taking account of auxiliary consumption and transformer losses.

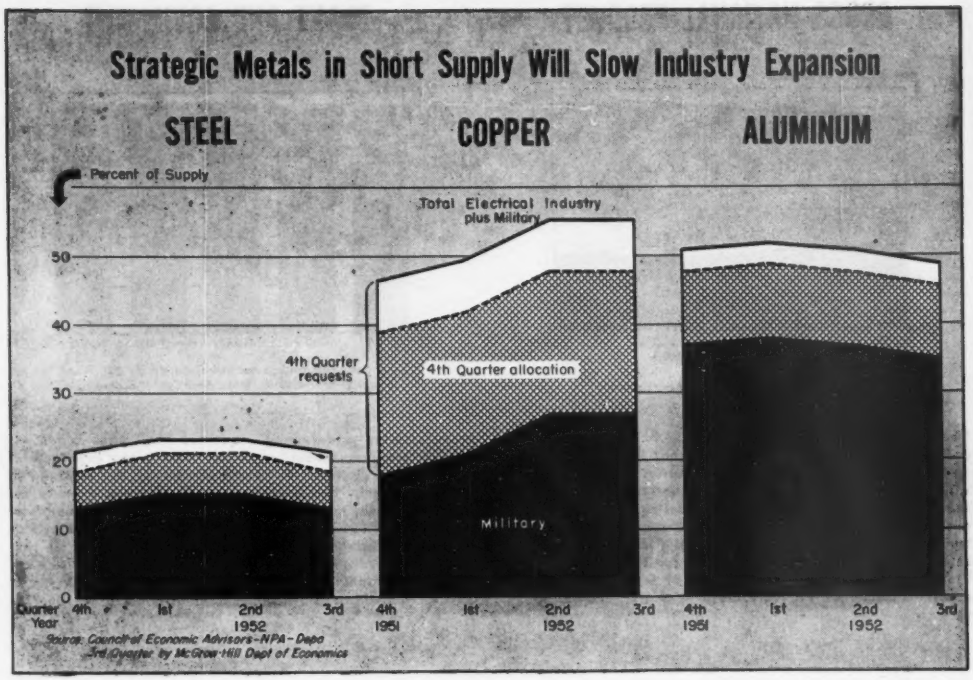
Periodically reversed plating of nickel conserves the scarce metal because it permits substituting copper in part as a foundation for chromium plating.

Interfacial tension test, power factor, and resistivity are nowhere near as significant indexes of askarel condition as they are of transformer oils.

Weather at an inaccessible point can be ascertained from an aircraft-dropped station which sets itself up and reports temperature, pressure, and humidity every 3 hours for 15 days to 100-mile receiving range.

Transformer askarel consists of essentially trichlor-benzene and heptachlordiphenyl with ⅛% of tin tetraphenyl added to scavenge HCl gas in case of transformer failure.

Voltage across the best non-linear resistance materials varies approximately as the fifth root of the current; i.e., for current ratio 10,000,000:1 the voltage ratio is 25:1.



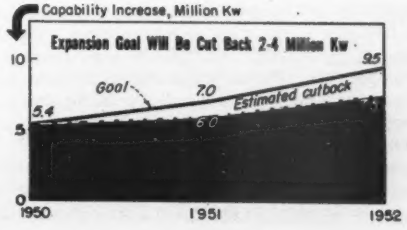
Electrical Industry Forecast for '52...

shows that steel, copper, and aluminum supplies will be the keys to electrical equipment deliveries and the utility expansion program. But capital additions in 1952 still will top 1951 by $200 million

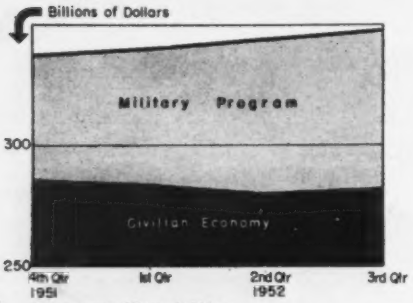
Latest information from industry sources indicate that a sharp cutback in the industry expansion plans is taking place. Maladjustments in production of equipment such as transmission pole line hardware and boiler tubes, along with material shortages, have cut 1951 capacity additions by about one million kw. Fourth quarter and later shortages in structural steel will be a primary cause of a two to three million kw loss in the 1952 utility expansion program.

In spite of these facts, capital expenditures will be on the increase in 1952 since the power station program will still be at a rate of some 25% above 1952. Transmission lines carried over from 1951 in addition to new projects will provide accelerated activity. A slight tapering in distribution expansions will result from lower rate of home building and fewer appliance sales. Construction costs are up about 10%. Total public and private additions of electrical power facilities will reach a new high of around $3.4 billion compared with an estimated $3.2 billion in 1951 and $3.0 billion in 1950.

Wages and fuel costs will continue upward thereby putting severe pressure on earnings of electric utilities. Rate increases may be required nationwide in the next eighteen months to keep earnings attractive.



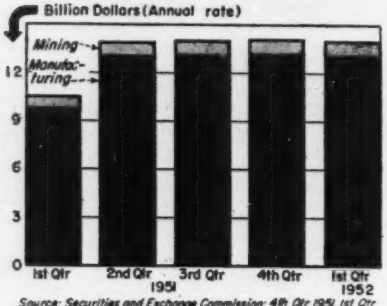
GROSS NATIONAL PRODUCT



Source: Council of Economic Advisors
3rd Quarter, 1952 by McGraw Dept of Economics

The next 12 months will see the U. S. economy reach a peak in defense spending. At least, that is the present plan as laid down by Defense Mobilizer Charles Wilson. Spending will rise rapidly through the second quarter of 1952. During that period defense will claim an increasing share of the gross national product. But by the third quarter of next year, military requirements should level out. And if national output rises as expected, there will be more left for the civilian sector. This is an overall picture. The impact of defense requirements on civilian supplies will vary, both in degree and in timing.

PLANT AND EQUIPMENT



Source: Securities and Exchange Commission; 4th Qtr 1951, 1st Qtr 1952 estimated by McGraw-Hill Dept of Economics

Manufacturing and mining industries have huge plant expansion programs under way. But most plant expansion is being slowed down in the fourth quarter by the shortage of structural steel. This probably means that the demand for steel and copper in industrial construction will continue pressing well into 1952. However, industrial construction of this defense-supporting type should be largely completed in the first half of next year. Manufacturing firms may still want to build or improve plants to make civilian products, but this type of construction will not have the same priority on metal supplies.

Materials Outlook

The combined requirements of the electrical industry and the military will, by the second quarter of 1952, require 23.2% of the steel, 55.4% of the copper, and 52.1% of the total aluminum supply. Actual consumption will drop below this mark because of smaller allocations to electrical equipment and facilities. Except for copper and perhaps aluminum, supplies of metals will be easier after the second quarter of 1952.

The target for aluminum is 1.5 million tons a year. This is roughly double the capacity at the beginning of the defense program. Altogether 638,000 tons of additional aluminum capacity has been announced as the goal. Of this amount, only 320,000 tons is actually under construction. The remainder, if approved, will not be producing before mid-1953 or later.

Refusal to allow additional expansion by Alcoa, Kaiser, and Reynolds is the main stumbling block. They are expanding by 205,000 tons, 200,000 tons, and 120,000 tons respectively. The current aluminum program, which is far behind schedule, was planned to fill the needs of a military airplane program of 95 wings. Now it looks as if Congress might go as high as 130 wings.

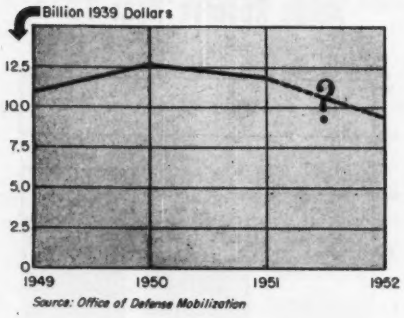
Copper is the only one of the three controlled materials without a solution in sight. Supply will be 15% less than demand as far ahead as the end of 1953. Two important mines are coming into new production over the next couple of years—White Pines, Michigan, and San Manuel in Arizona. But we'll be lucky if these new sources of copper keep up with mines which are playing out. We can't do much better than a 5% net gain in domestic copper output between now and the end of 1953. Compare that with a present demand for copper which is 170% of supply. Copper threatens to be a bottleneck indefinitely.

Production-wise, steel is the prize winner. Pre-Korea we were at an annual rate of production of around 100 million tons. Now we are at 108 million. An additional 10 million capacity will be added by the time the program reaches the goal in mid-1953. We can be a lot more certain of this than we can about aluminum meeting its goal. Steel projects got started sooner, as there was no controversy over monopoly to hamstring the bureaucrats.

Structurals, plates, and alloys will remain short. Bars are short now but may loosen up a bit next year. Sheets should also get easier next year.

As CMP begins to bite into the economy, one hears a lot of complaints about steel—manufacturers can't always get their CMP allotment for steel accepted by a mill. Chances are this will be ironed out in 60 to 90 days. The current confusion has a tendency to exaggerate the steel shortages. They are not as bad as they now appear to be. On the other hand, steel will not be plentiful as soon as some spokesmen for the industry say. The selective shortages will continue all of next year.

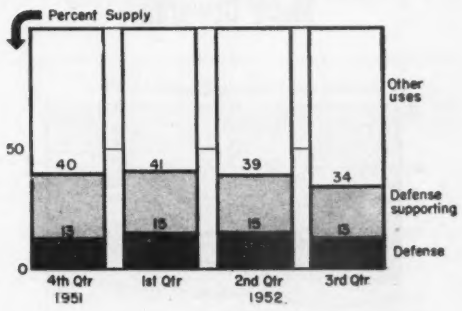
U. S. CONSTRUCTION



Source: Office of Defense Mobilization

Construction of highways, public buildings and the like is a sore point in the present mobilization program. There seems to be little justification for finishing many projects today that could easily be put off till 1952 and 1953. But when the whole program is put together, there is a clear indication of relief in 1952. Home building is expected to rise and absorb any excess material that may be available. Utility construction should go forward on schedule by the end of 1952. However equipment deliveries will still be delayed by the critical situation in the production of copper.

DISTRIBUTION OF STEEL



In the case of steel, military and defense-supporting requirements together will hit a peak in the first quarter of 1952. All other users will get less than 60% of total steel output. But by the third quarter of '52 this share should be up to 66%. Steel output will be up. Military requirements will have levelled out. And defense-supporting needs will be down. With an easier steel supply, the metals overall picture will be quite different late in '52 from what it is at present, or will be in the next few months. By this time steel should no longer be one of the bottlenecks in the power expansion program.

Consumer Markets

Consumer income and expenditures are still the keys to a large percentage of the electrical industry growth. Today with all the cuts in home building, appliances, and equipment supplies, residential kwh sales are running 10% and commercial sales 7% above 1950.

The consensus today is that by the beginning of 1952 the heavy inventories of appliances will have been worked down to normal levels. Consumer purchases should again be stabilized on a normal and relatively high level.

Uptrend in buying? . . . Consumer spending recently has been so low in relation to income that some increase seems certain to occur before long. During the three months ending in June, consumers spent less of their incomes—and saved more—than at any time since early in 1946. Since World War II, consumer expenditures have ranged, most of the time, between 94% and 97% of disposable income. But in the second quarter of this year, they were down to 91%. Only in the wartime days of shortages, rationing, and strict price controls was the spending ratio much lower than that.

The low spending ratio of the second quarter will pick up as the months go by. The table below estimates consumer expenditures for the remainder of 1951 under two assumptions: (1) the ratio of spending to income does not increase significantly; (2) the more likely possibility that spending ratio heads back toward the postwar norm, and gets to about 94% of income. Expenditures for the first two quarters of this year are also shown for comparison. **Under these assumptions,** spending will take from 90-94% of disposable income and will show a rise of 2%-5% from the second to the fourth quarter of this year. Sales will be higher than in the first quarter of 1951, a pretty satisfactory period. By mid-'52, the rise will be considerable. If there should be another war scare and another sharp rise in the spending ratio, it would mean an inflationary buying wave.

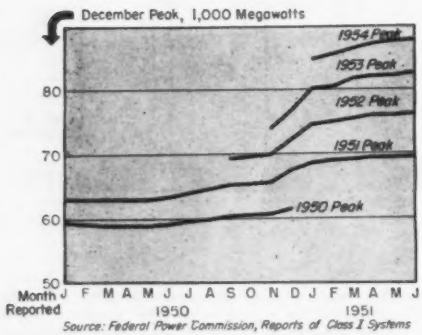
Perhaps the only shadow on this bright picture will be the supply of appliances. In 1952 further cuts may be forthcoming in materials, particularly copper, for this specific class of consumer goods.

Income, Spending and Savings

(Annual rates in billions of dollars, estimated quarterly)

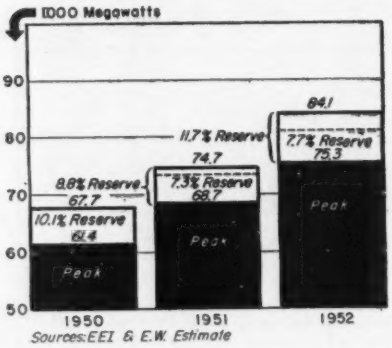
	Disposable Income	Personal Consumption (present spending ratio)	Personal Consumption (94% spending ratio)	Savings (present ratio)	Savings (94% ratio)
2nd—1951 (preliminary)	220	200	...	20.0	...
3rd—1951 (est)	221.5	203	208	18.5	13.5
4th—1951 (est)	223.5	205	210	18.5	13.5
2nd—1952 (est)	230	209	216	21.0	14.0

Estimates of December Peak Move Upwards



ESTIMATES of peak loads are constantly revised upward to keep up with defense loads

Peak Load Rising With Capability Holds Reserve Near 7%



CUTBACKS in turbogenerator deliveries will hold average reserve near 7% of peak load

Power Expansion Program Grows . . .

with two million kilowatts of capacity ordered in three months. Reserves will be short but adequate in 1952

Will peak load estimates shrink as much as turbogenerator deliveries? This is the main question now facing the utilities and the defense agencies. No one doubts the fact that delays in industrial expansion will push back the date that some generating facilities are needed. Right now there are two essential industrial plants that are without additional transmission ties to the power source. But there is no human being or group of them who can coordinate the construction schedules of mobilization facilities. Power facilities must be kept on schedule to assure supply for essential industry.

On the other hand, it is likely that peak loads will be above rather than below estimates. Monthly data on peak loads submitted to the Federal Power Commission, shown in the chart, illustrate the amounts by which estimates are raised. Estimates of the December 1951 peak were increased from 63.2 million kw in June 1950 to 69.5 million kw in June 1951.

We are adding a military program on top of a very healthy civilian economy that has shrunk much less than anyone expected. In view of this situation, it can safely be assumed that any generating equipment not delivered in 1951 and 1952 will merely be pushed back to 1954 and 1955. Confidence in the fact that capacity requirements will increase rather than decrease is evidenced by the fact that in the three months after April 1, 1951 utilities ordered 2 million kw of turbogenerators on top of the 26 million kw of capacity which were on order books at that time. **Present indications** are that the average reserve generating capacity at the time of the winter peak will be 7% compared with around 10% in 1950. Schedules for new capacity additions indicate no relief for this low reserve in 1952. But it must be understood that extreme shortages in the TVA area and the Northwest exaggerate this picture. Little trouble should be experienced in other areas. The tendency to place large power consuming plants in federal subsidized power areas creates this situation. Utilities in territory adjoining TVA are supplying large amounts of power for this area.

Utility company budgets for 1951 showed large increases in planned transmission line expenditures. A total of $433 million for 1951 compared with $300 million spent in 1950. Total planned expenditures in 1951 amounted to $2,558 million. In 1952 increased expenditures for power stations of from 15% to 25% will be required to maintain even the reduced program. Transmission expansion will continue at a high rate. Distribution and general plant expenditures would be expected to go downward except for increases in construction costs which will offset this trend.

In total, electric utility companies will spend around $2,750 million in 1952. All utilities, both public and private, will spend $3,400 million for electric facilities. This represents a new all-time record year for capital additions by the electric power industry.

Utility Wage Rates To Climb Further . . .

as Wage Stabilization Board allows increases in line with consumers' price index

The end of the trend toward higher costs of operation is not in sight and electric utility wage costs will continue upward through mid-1952. Moreover, the wage rise in industry generally will force still higher the prices utilities pay for equipment, materials, and services.

The amount of the rise will be controlled under the Defense Production Act, which runs until June 30. But there definitely will be a rise in prices, wages, and cost of living.

Government stabilizers are committed to a wage policy which will let wages rise equally with the rise in the consumers' price index of the Bureau of Labor Statistics. All workers will be treated alike—if they can get employers to agree to wage increases—whether or not they work under cost-of-living escalators and whether or not they have a union contract.

Economists in Washington look for the CPI to rise a point a month until the end of the year, or up to about a 191.0 index figure. After that, they anticipate a rise of slightly more than a point a month during the first six months of 1952. This will generate wage increases of five or six cents an hour under existing escalator clauses by March 1. Part of it will become due December 1 under the General Motors and other escalators patterned after it.

Only a couple of cents, if any, may be due to employees of General Electric and Westinghouse in September negotiations with the CIO International Union of Electrical Workers and the Independent United Electrical Workers. That is because these companies gave a cost-of-living increase of nine cents an hour earlier this year. But you can look for a larger wage increase in the steel industry by January and in coal mining by April.

In steel, wages will rise about 6%, or about 11 cents an hour. In coal, the rise will be just slightly higher because of later negotiations. Some wage negotiations may be advanced earlier, under union pressure, under the administration's new policy of permitting—every six months—increases in keeping with rising living costs even where there is no escalator clause. This would tend to raise some wage costs sooner than anticipated.

By seeking to preserve the "real value" of wages as of January 15, 1951, the administration will permit a larger increase in steel and coal mining than would have been allowed by sticking to the January 15, 1950, base of the Reg. 6 "catch-up" formula. Last year's steel and coal wage rises exceeded the 10%, but they will not hurt the unions in coming negotiations. They can start from scratch, using last January 15 as a base from which to measure cost-of-living.

With wages of all workers measured by the cost of living index—where employers agree to them—the wage rise in utilities should keep up pretty much with those in other industries.

Electric Utility Wage Increases—1951

Company	Wage Increase	Related Information
New Bedford G & El Lgt, Mass.	9–17¢	.....
Niagara Mohawk Power Corp.	3%	3%–12/50
N. Y. State Elec & Gas Corp.	6%	.....
Penn. Elec Co.	6%	.....
Luzerne Co Gas & Elec Corp.	8¢	Imp vac, ad hol, sk lv, O. T. meal
Virginia Elec Power Co.	6%	.....
Montana-Dakota Utilities Co, Mpls.	17¢	.....
Montana-Dakota Utilities Co, Mont, Dakotas	10–12¢	.....
Salt R Proj Agri Improvmt & Pwr Dis, Ariz.	8–35¢ (av. 17 1/2¢)	.....
San Diego Gas & Elec Co.	1¾% & 4½%	Nego. 10/50
Pacific Gas & Elec Co, Cal.	2¢ (1%) & 5½%	Nego. 8/50, 4A51
Cowlitz Co PUD, Wash.	6% (av 10½¢)	.....
Pacific Co PUD, Wash.	6–7½%	.....
Penn Pwr & Lgt Co.	3½%	.....
Delaware Power & Lgt Co.	5%	.....
Detroit Edison Co.	2¢ & 4¢	1/51 & 6/51
Public Service Co, of N. Mex.	7.4%	.....
Washington Water Power Co.	5%	.....
Tucson Gas, Elec Lgt & Pwr Co.	Av 7%	Ad 2% when allowed by WSB
Tucson Gas, Elec Lgt & Pwr Co.	Av 10¢	Ad 1½¢ subj WSB aprvl; ad 7½¢ if 10% formula changed 4/51
Cleveland Elec Illum Co.	6½¢	.....
Pacific Gas & Elec Co, Cal.	5.8%	.....
Utah Pwr & Lgt Co.	7.5%	.....
Southern Cal Edison Co.	10¢ or 10% (whichever is greater)	.....
Public Service Elec & Gas Co. N. J.	2% & 4%	Nego. 10/50, 5/51
Manufacturers Lgt & Heat Co, Pa.	$10 mo.	Recd 4¢ 12/50
Metropolitan Edison Co, Pa.	6–12¢	.....
Consumers Power Co, Mich.	6%	Minimum 9¢; imp vac imp hosp
Conn. Power Co.	5%	Nego. 1/51
Niagara Mohawk Pwr Corp.	3%	.....
Eastern Shores Pub Ser Co of Md; Seme of Va; Del Pwr & Lgt Co.	4½%	.....
Toledo Edison Co.	7¢	Ad 1¾¢ wall; total 10% since 1/50
Dayton Pwr & Lgt Co.	6¢	Ad 5¢ if 10% limit lifted or utilities exempt from freeze
Public Service Co of Ind, Inc.	5%	Ad 2% replace Xmas bonus, ad 1–7¢ adj in all classif exc lowest 3
General Minnesota Utilities.	2¢	.....
Potomac Edison Co, Md.	7.7¢	.....
Bangor Hydro-Electric, Me.	4 to 12¢	.....
Intercounty R E Co-op, Ky.	18¢	.....
Kansas Gas & Elec Co.	5%	.....
Eastern Kansas Utilities, Inc.	4.3%	.....
Edgar Elec Co-op Assn, Ill.	9%	.....
Corn Belt Elec Co-op, Inc, Ill.	5%	.....
Savannah Elec & Pwr Co.	2%	1/51
Georgia Power & Light Co.	2½ & 2%	1/51–7/51
Florida Power Corp.	2½ & 2%	1/51–7/51
Western Colorado Power Co.	5–25¢	Subj to WSB
Southern Colorado Power Co.	4½%	Subj to WSB
Sierra Pacific Power Co.	6.4%	.....
Arkansas Power & Light Co.	$10–20/mo	.....
Citizens Utilities Co, Ariz.	5–10¢	.....
Rock County Elec Co-op Wis.	11½–19¢	.....
Mason County PUD #1 & 3.	10¢	.....
Green Mountain Power Co, Vt.	4¢	.....
Southwestern Pub Ser Co, Texas	5–12¢	.....
El Paso Elec Co.	4%	.....
Dallas Power & Light Co.	4½%	.....
Albia Lgt & Railwy Co, Iowa.	7½¢	.....
Interstate Pwr Co of Dubuque, Ia.	3½% & 3½%	1/51 & 4/1
Interstate Pwr Co of Minn.	3½% & 3½%	.....
Citizens Elec Co, Missouri.	15%	.....
Missouri Edison Co.	8–10¢	.....
Missouri Pwr & Lgt Co.	6½¢ & 6½¢	10/1 & 4/2
St Joseph Lgt & Pwr Co.	5%	.....
Patchogue Elec Lgt Co, N. Y.	5%	9/51 ad 3½%
Tide Water Power Co, N. C.	10%	.....
Cincinnati Gas & Elec Co & Union Lgt, Heat & Pwr Co.	7–9¢	.....
Cal.-Pacific Utilities Co, Ore.	5%	.....
Cal.-Oregon Power Co, Ore.	5%	.....
Pacific Pwr & Lgt Co.	5%	.....
Western Oregon Elec Co-op.	5%	.....
Tillamook Peoples Utilities, Ore.	5%	.....
Salem Elec Co-op Assn, Ore.	5%	.....
Portland-General Elec Co, Ore.	5%	.....
Tri-State Elec Co-op, Tenn.	7–10%	.....
TVA	6–11%	.....
No Western Pub Ser, S.D. & Neb.	2¢	1/51
Northern Penn. Power Co.	3% & 3%	1/51 & 6/51
S. C. Elec & Gas Co.	6½%	.....
East Central Okla Elec Co-op, Inc.	15%	.....
McCone Co Elec Co-op, Mont.	14–18¢	.....
Fergus Co Elec Co-op, Inc, Mont.	15¢	.....
Magnolia Elec Pwr Assn, Miss.	2½¢	.....
Minn. Valley Elec Co-op of Jordan.	$12/mo	.....
Kansas City Power & Lgt Co, Mo.	9½¢	.....

Source: BLS and IBEW

Utility Earnings Turn Down . . .

while capital expansion increases and wages, taxes, fuel, and money costs go up faster than revenues. Higher net income will come in 1952

For the twelve months ending May 31, 1951, gross income of Class A and B electric utilities had increased only 2.2% and net incomes 0.9% while electric utility plant gained 9.4%. At the present time this situation is becoming materially worse with net income down 10.4% in May and 6.1% in June compared with a year ago.

Electric utility operating revenue rate of growth also continues to decrease compared with the last 12 months. A leveling off at 10% increase per year is predicted for the next eighteen months. Rate increases will be reflected in this gain.

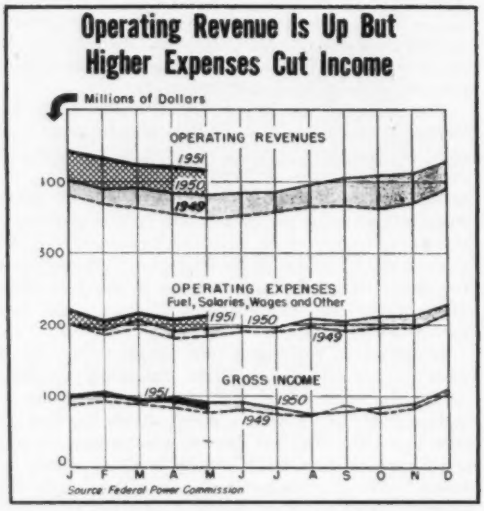
In the past year Class A and B electric utilities have spent around $1,050 million on power station additions, $350 million on transmission, $900 million on distribution and $100 million on general plant. This total of $2,400 million spent has produced a net increase in electric plant of $1,700 million. It would be expected that this would require increased gross income of around $65 million and $130 million more revenue at present use of energy. This would seem to indicate the extent of adjustments in electric rates necessary to maintain earnings at a satisfactory level.

Outlook for 1951 . . . Utility expansion plans for 1951 contemplated expenditures of around $2.5 billion for Class A and B companies. As shown in the table, a sharp reduction in rate of return is indicated due to failure of gross income to grow proportionately to electric plant additions. Delays in rate adjustments have been due to uncertainties in the tax picture. But it is expected that much activity will be apparent after the new taxes are levied.

All classes of customer consumption are expected to grow at slightly lower rates in the foreseeable future. Compared with increases of 13.5% for residential, 10.1% for commercial, and 21.9% for industrial classes in the 12 months ending May 21, 1951, estimates for this year's growth are 12%, 8.7% and 12% respectively. As the FRB Industrial Index levels out between 230 and 240, the rate of increase of industrial sales drops back. The index stood at 214 at the end of the last year. It has been expected that curtailment in materials would have a retarding effect on the industrial business growth.

1952 Looks Better . . . As earnings of the utilities are brought into line by rate increases or tax adjustments, return on rate base and earnings per share should be restored to near 1950 levels. Fortunately there is a margin above dividends for most companies to maintain stability in dividend payments throughout the entire period.

Expenditures for electric plant will be increased as pre-



GROSS INCOME for 12 months ended May 1951 showed only 2.2% increase over previous year. Net income rose only 0.9% for the same period compared to 8.8% in 1950, 14.7% in 1949

Revenues and Expenses of Class A and B Utilities
(Millions of Dollars)

	1950 (Actual*)	1951 (Estimated**)	1952
Operating Revenues	4,773	5,248	5,750
Operating Revenue Deductions			
Operating Expenses	2,451	2,685	2,854
Fuel	761	856	941
Salaries and Wages	919	1,013	1,064
Others	771	816	849
Depreciation	435	478	531
Taxes	931	1,120	1,277
Total Revenue Deductions	3,817	4,283	4,662
Net Operating Revenues	956	965	1,088
Other Income	146	154	165
Gross Income	1,102	1,119	1,253
Income Deductions	278	300	324
Net Income	824	819	929
Total Electric Plant (average)	$18,151	$19,950	$21,890
Ratio Gross Income to Plant, percent	6.08	5.60	5.72

*Federal Power Commission **"Electrical World"

viously noted. Along with this a gain in sales and revenue of over 9% will provide adequate earning power. It is expected that industrial sales will grow even less in 1952 than in 1951 but residential, commercial, and farm business will continue to grow at about the current rate.

Operating Expenses . . . Operating expenses will be on the increase through 1952. It is estimated that they will go up 9.6% in 1951 and 6.3% in 1952. In 1950, the operating ratio was 51.3% compared with 38.4% in 1937, an increase of 12.9 percentage points or 33.6%.

Fuel—Total has been running higher all year with May showing 16.4% increase over a year ago. New records are being established for coal use due to higher oil costs, increased demand for electricity and new steam generating capacity coming on the lines. For the 12 months ended June 30, 1951, coal consumption totaled 100.6 million tons (record high) compared with 91.2 million for 1950 and 99.6 million (previous high) for 1948. It will probably reach 108 million tons by the end of 1951. Oil use is on the decline. This is probably due to higher prices of oil. For the twelve months ended June 30, 1951, utilities used 66.2 million barrels (42-gallons per barrel) compared with 75.3 million in 1950 (record high). It is expected to go down to 60 million barrels in 1951. Use of gas hit a new high of 681.8 million MCF for the 12 months ended June 30, 1951 versus 628.0 million (previous high) in 1950.

Salaries and Wages—For the twelve months ending May 31, 1951, salaries and wages were up 9.0% over the previous 12 month period. The year is expected to end with a gain of 10% over 1950. A better balance for 1952 is predicted thereby showing only a 5% increase for that year.

Other Expenses—For the first five months of 1951 other expenses were running 5.9% over 1950. Estimates include a 6% gain for all of 1951 and 4% for 1952.

Depreciation—This item has been gaining around 10% so far in 1951 over 1950. This should increase to about 11% for 1952 as new plant is being added at a faster rate and accelerated amortization will be included.

Taxes—In 1950, taxes became the largest expense in the income statement, amounting to $931 million, replacing salaries and wages which showed $919 million. If Congress passes the 52% corporate income tax rate, retroactive to January 1, 1951, it is estimated that taxes for 1951 will total $1,120 million. By the end of 1952, it will amount to an estimated $1,277 million. This will mean that taxes will take 22.2¢ for each dollar of revenue received. This compares with 19.5¢ for 1950.

Elimination of the 3⅓% electrical energy tax will add about $55 million to net income. This would cut about 50% off the required rate increases.

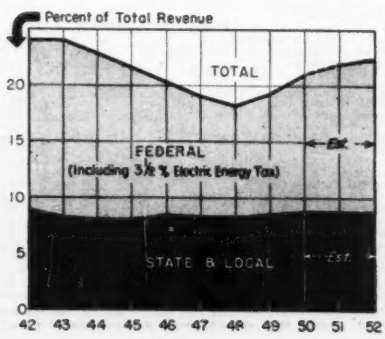
Gross Income . . . Gains in gross income have been steadily decreasing since May 1950. For the 12 months ended that date it showed an increase of 13.5% over the previous year. A year later (12 months ended May 31, 1951) it had declined to 2.2% over a year ago. Since January 1, 1951, it has shown an even lower gain. By June it had dropped to 2.6% under 1950. But this downward trend is expected to reverse by the end of 1951. And in 1952 gross income will continue on the upward trend.

Income Deductions—Slated to go upwards are income deductions. So far in 1951, there have been $550 million of bonds sold. By the end of 1951, it is estimated that another $250 million will be sold.

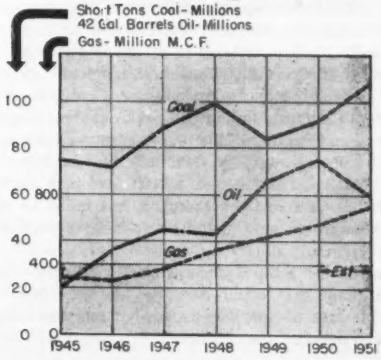
Net Income . . . Since 1949, net income has been decreasing from 14.7% increase over 1948 to 8.8% in 1950 and 0.9% for the 12 months ended May 31, 1951. There is little chance of doing more than slowing the trend in 1951 but 1952 will show substantial improvement over current conditions.

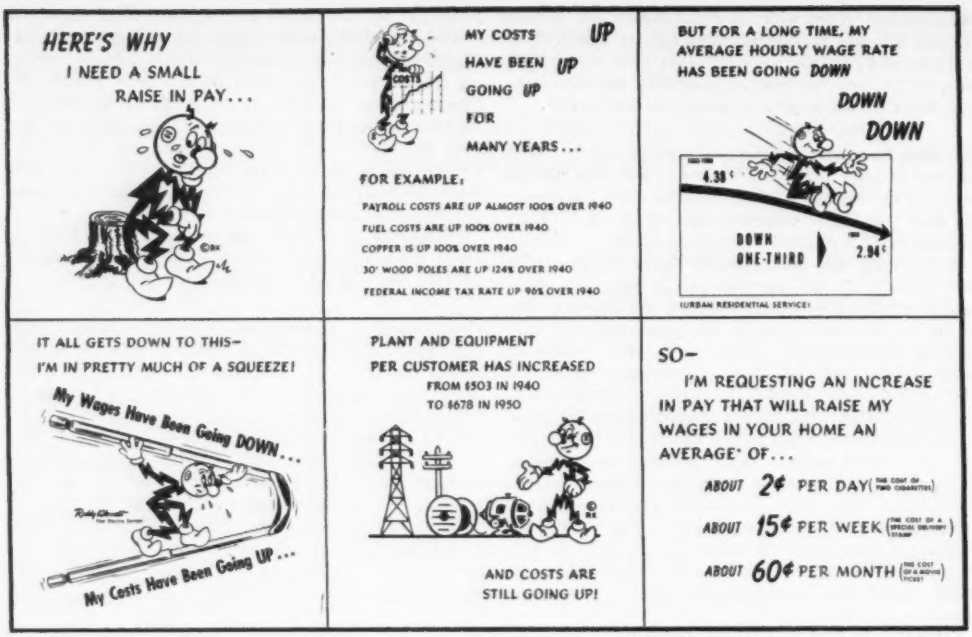
Common stock dividend payments have recently been increased by a number of utilities more fortunately situated. Others have plans for increasing dividend payments as outlook is clarified on taxes, earnings, and rate increases. Certainly such should be the case in the growing electrical industry.

Taxes Are Seeking Levels of World War II



Use of More Coal and Gas Reflects Rising Oil Costs




HERE'S WHY
I NEED A SMALL
RAISE IN PAY...
MY COSTS UP
HAVE BEEN UP
GOING UP
FOR
MANY YEARS...
FOR EXAMPLE:
PAYROLL COSTS ARE UP ALMOST 100% OVER 1940
FUEL COSTS ARE UP 100% OVER 1940
COPPER IS UP 100% OVER 1940
30' WOOD POLES ARE UP 124% OVER 1940
FEDERAL INCOME TAX RATE UP 90% OVER 1940
BUT FOR A LONG TIME, MY
AVERAGE HOURLY WAGE RATE
HAS BEEN GOING DOWN
DOWN
DOWN
4.38¢
DOWN
ONE-THIRD
2.94¢
(URBAN RESIDENTIAL SERVICE)
IT ALL GETS DOWN TO THIS—
I'M IN PRETTY MUCH OF A SQUEEZE!
My Wages Have Been Going DOWN...
My Costs Have Been Going UP...
PLANT AND EQUIPMENT
PER CUSTOMER HAS INCREASED
FROM $503 IN 1940
TO $678 IN 1950
AND COSTS ARE
STILL GOING UP!
SO—
I'M REQUESTING AN INCREASE
IN PAY THAT WILL RAISE MY
WAGES IN YOUR HOME AN
AVERAGE* OF...
ABOUT 2¢ PER DAY (THE COST OF TWO CIGARETTES)
ABOUT 15¢ PER WEEK (THE COST OF A SPECIAL DELIVERY STAMP)
ABOUT 60¢ PER MONTH (THE COST OF A MOVIE TICKET)

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Numerous Electric Rate Increases . . .

have been granted this year and many more are pending to stop decline in earnings

Those companies for which information is available have received rate increases in 1951 amounting to over $13 million annually. Rate applications on file with public bodies total another $60 million. The largest rate increase is being asked by Pacific Gas & Electric Co, totaling $37.7 million. PG&E has reported that "even with these additional earnings, the company would have a return of only 5.8% on $1.2 billion invested in the electric system."

The Office of Price Stabilization has entered its ninth protest (seven before Federal Power Commission and eighth with California Public Utilities Commission) against rate increases by utilities. The most recent was in connection with an application by California Electric Power Co for a $1,520,850 rate hike. In a brief filed with the California PUC, OPS said the company had failed to make a case and the proposal would be a "long forward step" toward inflation.

Repeal of the 3 1/3% federal electrical energy tax is the one thing that could save the industry from the undesirable task of applying for further rate increases in addition to those on file.

Electric Rates Are Going Higher

(Typical rate increases and Applications)

Company	Date Effective—1951	Yearly Amount
Rate Increases		
Arizona Edison Co.		8%
Arkansas Power & Light Co.	Jan. 1	$200,000
Central Vermont Public Service Corp.	July 28	263,000
Cleveland Electric Illuminating Co.	April 1	350,000
Dallas Power & Light Co.	Feb. 1	1,900,000
Duquesne Light Co*	Oct. 21	3,557,000
Georgia Power & Light Co.	July 1	125,000
Maine Public Service Co.	Feb. 20	287,600
Niagara Mohawk Power Corp.		2,750,000
Northern Wisconsin Power Co.		8,600
Potomac Electric Power Co—D. C., Md. and Va.		3,012,000
Public Service Co of New Hampshire	Aug. 1	600,000
Rochester Gas & Electric Corp.	June 9	6%
Southwestern Public Service Co.	Mar. to June	10%
Rate Increase Applications		
Arkansas-Missouri Power Co.		$580,950
Bangor Hydro Electric Co.		560,000
California Electric Power Co.		1,520,850
California-Oregon Power Co.		1,043,000
Central Maine Power Co.		3,050,000
Georgia Power Co.		4,275,000
Gulf States Utilities Co.		20%
Kansas City Power & Light Co.		2,800,000
Madison Gas & Electric Co.		143,600
New Jersey Power & Light Co.		1,000,000
Pacific Gas & Electric Co.		37,650,000
Union Light, Heat & Power Co (Ky)		327,300
Washington Water Power Co.		7.8%
Western Massachusetts Electric Co.		1,200,000
West Penn Power Co.		4,500,000
Wisconsin Power & Light Co.		1,250,000

*$7,721,000 rate increase was put into effect Jan. 10, pending commission approval. Lower rate was announced by commission on Aug. 30.

Copper Requirements for Power Systems

Determination of copper requirements from generator to meter can be based on this analysis of a hypothetical system. Required copper can be expressed in lbs per kva load at system peak

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General Electric Co, Schenectady, N. Y.

With copper on the list of critical materials, we are prompted to take a look at the copper required for all components of a power system. Naturally, the copper for a given load will be different for each system in the country because of differences in equipment and line loadings and in distance between loads and sources of power. However, an analysis of a hypothetical system, which could represent many systems in the country, will give us a clue as to copper requirements, although it will not be an exact answer for a particular system or group of systems.

The hypothetical system chosen for this analysis has ten generators totalling 250-Mw capacity. These units are called upon to serve a peak load of 200.7 Mva.

Total number of residential customers served by this system is 55,440, with 1,848 customers per residential feeder. As to number of commercial and industrial customers, we assume that they represent a certain load at time of system peak, regardless of the number served by commercial and industrial feeders.

Diversified demand per residential customer was assumed to be 4 kva at the service, 1.43 kva at the distribution transformer, and 0.78 kva at the distribution substation. Consumption per residential customer for this demand would be about 2,000 kwhr annually. Diversity factor between distribution transformer and service tap was assumed to be 2.8; diversity factor between distribution substation and distribution transformer, 1.83. For loads on commercial and industrial feeders there were no diversity factors assumed because these loads were considered to occur at time of system peak.

Results of an analysis of such a system are presented in this article. The system is shown in Fig I on the following page. Details of feeders serving the various classes of load are shown in accompanying illustrations on the next two pages.

Copper Requirements For a Power System

Component	Pounds per Kva
Generation	3.8
Transmission and Subtransmission	31.0
Distribution	
Residential	113.8 to 131.8
Commercial	52.7 to 80.0
Industrial	6.6 to 73.3

Copper requirement is based on pounds per kva of load at time of system peak. Requirements include allowance for reserve generating capacity; otherwise requirements are based on fully loaded system components at time of peak load.

The most convenient way to express copper requirement is in pounds of copper per kva of load at time of system peak. Weight of copper per kva of load was obtained by adding up weight of copper in lines and equipment, and dividing it by diversified load in that portion of the system at time of peak.

Generation . . . Copper in the steam generating stations in Fig 1 is estimated to be 3.5 lb per kw of station capacity. This includes turbine-generators, all station equipment, and condensers. Of this amount, about 2 lb per kw is in the condensers. In the hydro station, required copper is estimated to be 2.3 lb per kw station capacity for all generators and station equipment.

Provision for reserve capacity will require that capacity in generation be greater than system peak load. Thus the above values will be somewhat greater when put on a peak load basis. This results in about 3.8 lb of copper per load kva in generating station and equipment for the combination of steam and hydro generation assumed to serve the load in our hypothetical system.

Transmission . . . Because transmission and loop subtransmission is installed to make a firm power source for all classes of load, it seems logical to put this copper on the basis of total system peak load. Taking the weight of copper in 150 miles of double circuit 138-kv transmission line and transformers at each end of the line, plus 36 miles of double circuit 33-kv subtransmission looping the load area, as shown in Fig 1, and dividing by system peak load gives a value of 31 lb of copper per kva of system peak load.

Residential Distribution . . . Details of the residential distribution system and loads in the various parts are shown in Fig 2. It will be noted that the residential feeder is represented by (1) in Fig 1. Thus, Fig 2 is an extension of the system from the distribution step-down substation shown in Fig 1 to the ultimate customer. The six miles of radial 33-kv subtransmission supplying distribution substations has been included with this class of load because it serves only this load. Pounds of copper per kva of residential load are given in Table I on the next page.

Commercial Distribution . . . Details of the commercial feeders, which are represented by (2) and (4) in Fig 1, are illustrated in Fig 3 and 5. Corresponding weights of copper per kva are listed in Table II.

Industrial Distribution . . . This hypothetical system has several ways of

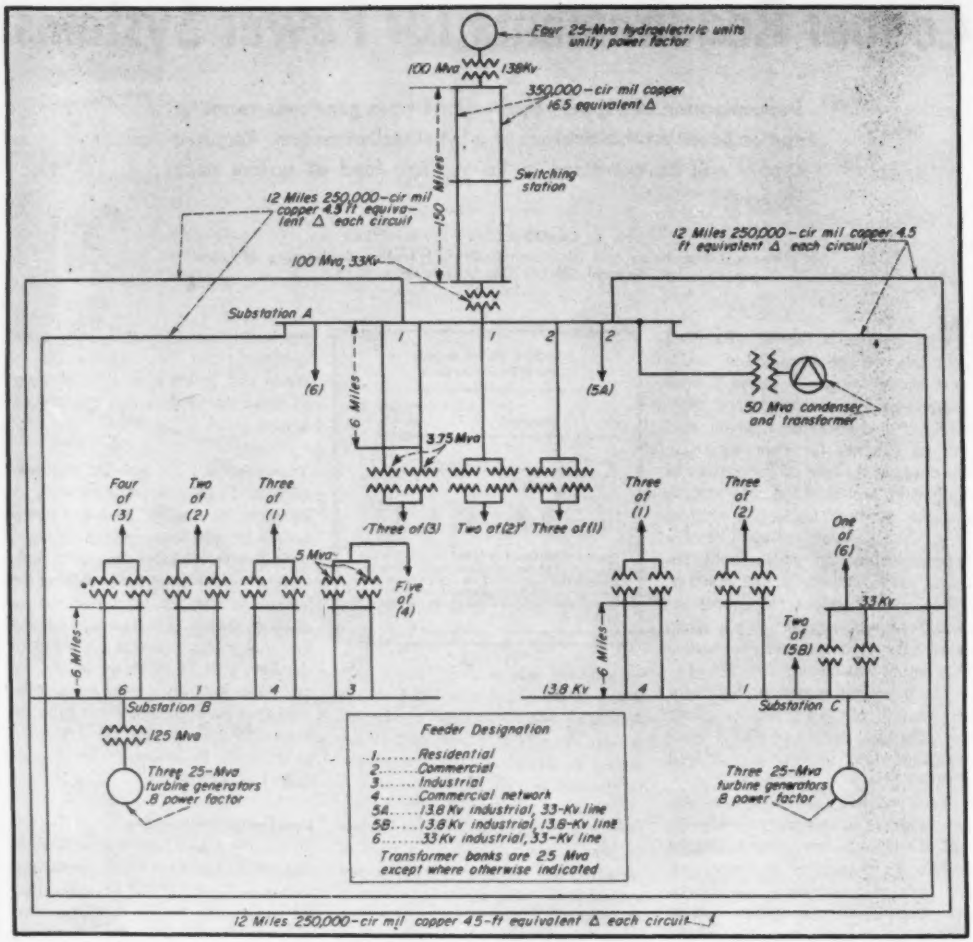


FIG 1—HYPOTHETICAL SYSTEM with a total of 250 Mw in capacity and serving a peak load of 200.7 Mw is comprised of these basic components. Details of distribution feeders to various customers are shown in following illustrations

TABLE I—Copper per Kva of Residential Load

System Component	Pounds per Kva
Distribution substations*	21-39
Feeder regulators	0.6
Primary feeders	
Three-phase express	12.6
Three-phase lateral	12.2
Single-phase lateral	42.0
Distribution transformers	3.5
Secondaries	17.4
Service drops	4.5
Total	**113.8-131.8**

* Includes corresponding subtransmission lines.

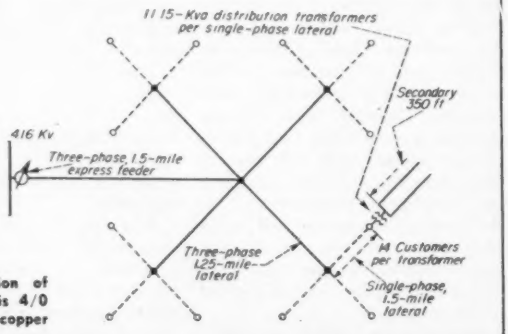


FIG 2—RESIDENTIAL DISTRIBUTION is continuation of feeder (1) shown in Fig 1. Express primary feeder is 4/0 copper; laterals are No. 2; and secondary is No. 4 copper

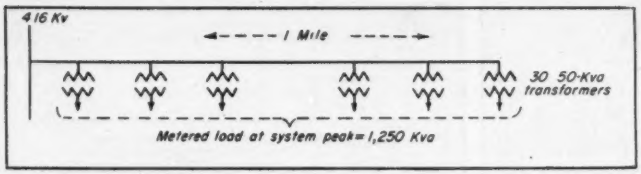


FIG 3—COMMERCIAL RADIAL type feeder is (2) in Fig 1. The 4.16-kv primary consists of three single-conductor, 350-Mcm cables supplying 30 50-kva transformers

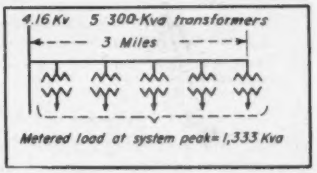


FIG. 4—INDUSTRIAL FEEDER consisting of 4/0 primary is (3) as shown in Fig 1

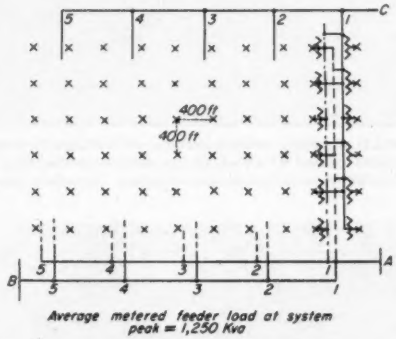


TABLE II—Copper per Kva of Commercial Load

System Component	Pounds per Kva Radial	Network
Distribution substations*	27.5–51.6	21.6
Primary feeders	26.4	13.4
Transformers	2.0	4.1
Secondaries	....	13.6
Total	55.9–80.0	52.7

* Includes corresponding subtransmission lines.

FIG 5—COMMERCIAL NETWORK system (4) has fifteen 4.16-kv primary feeders which are three-conductor 350-Mcm cable. Points marked X indicate feed-in to secondary network through 500-kva, 4,160—208Y/120-v transformers. Secondary grid uses two 250-Mcm single-conductor cables per phase

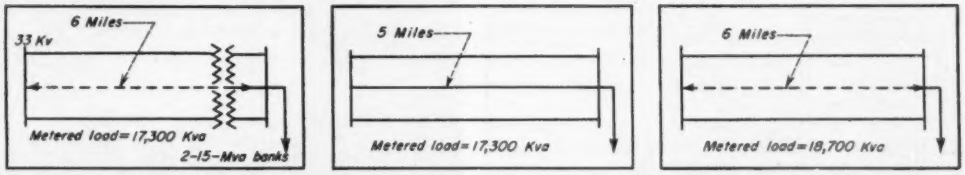


FIG 6—INDUSTRIAL FEEDERS serving large customers either involve a transformation or use a direct tap. At left, feeder serves the customer at 13.8 kv from a 4/0, 33-kv line (5A); center, the customer is served at 13.8 kv from a 13.8-kv bus (5B) over a 250-Mcm line; right, feeder serving the customer at 33 kv from the 33-kv system (6) is a 4/0 circuit

serving industrial customers, shown in detail in Fig 4 and 6. Feeders shown in these illustrations are extensions of feeders marked (3), (5A), (5B), and (6) in Fig 1. Copper per kva in this part of the system, not including copper in systems of the industrial plants supplied, is given more specifically in Table III.

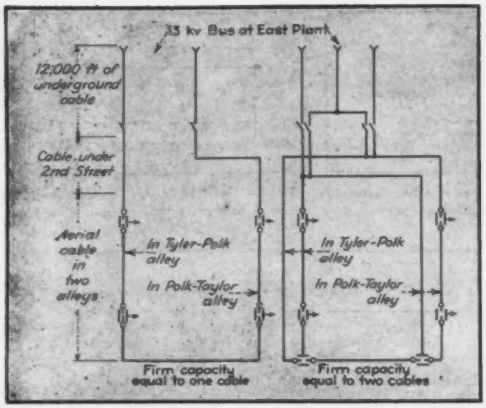
Weight of copper per kva of peak load depends upon the desired degree of reliability. Obviously, the more reliable a system is to be, the more copper per kva there will be used in that system. In our hypothetical system the degree of reliability is such that adequate service to all customers will be maintained under normal conditions.

TABLE III—Copper per Kva of Industrial Load

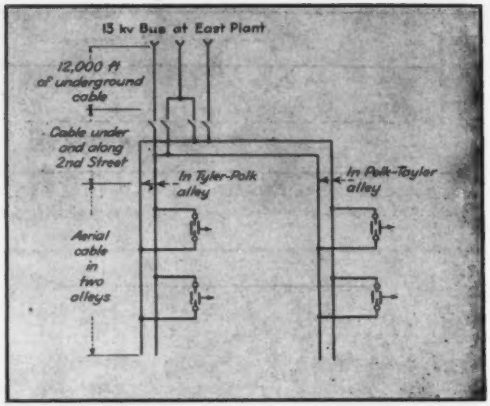
System Component	Utilization Voltage and Supply Voltage			
	240 v from 4.16 kv	13.8 kv from 33 kv	13.8 kv from 13.8 kv	33 kv from 33 kv
	(Pounds per Kva)			
Distribution substation*	24.9–33.3	....	....	....
Primary feeders	38.0	7.2	10.6	6.6
Industrial supply transformers	2.0	1.2	....	....
Total	64.9–73.3	8.4	10.6	6.6

* Includes corresponding subtransmission line.

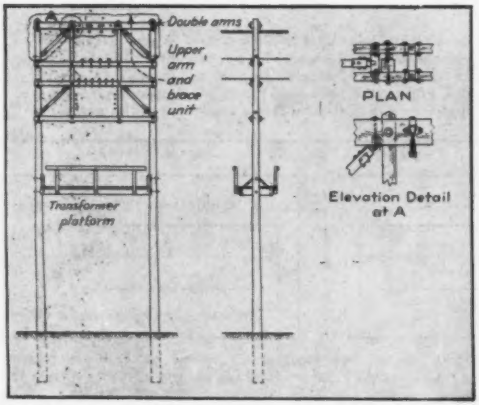
Fully Loaded System . . . One important point to be considered in this analysis is that copper per kva of load in an actual operating system could very well be greater than values determined by this analysis. Our system is assumed to be fully loaded. In an actual system, extra copper logically would be installed in anticipation of load growth. Also, in an actual system, installation of extra copper may be necessary to take care of excessive voltage drop.


13 kv Bus at East Plant
12,000 ft of underground cable
Cable under 2nd Street
Aerial cable in two alleys
In Tyler-Polk alley
In Polk-Taylor alley
In Tyler-Polk alley
In Polk-Taylor alley
Firm capacity equal to one cable
Firm capacity equal to two cables

AERIAL CABLE, 13.2-kv, loop scheme was ruled out because of hazard resulting from oil switches in series with the loop even though it offers a convenient means of fault isolation

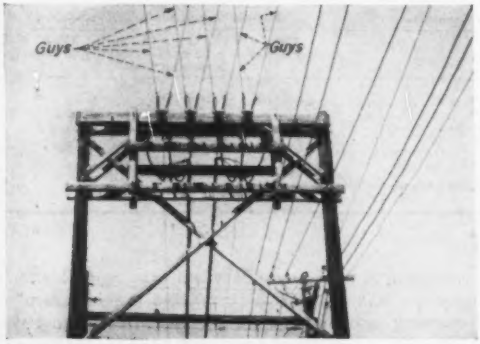

13 kv Bus at East Plant
12,000 ft of underground cable
Cable under and along 2nd Street
In Tyler-Polk alley
In Polk-Taylor alley
Aerial cable in two alleys

PARALLEL RADIAL primary system was selected because it eliminated hazard of oil switch in series with the loop and had flexibility for eventual growth into a secondary network

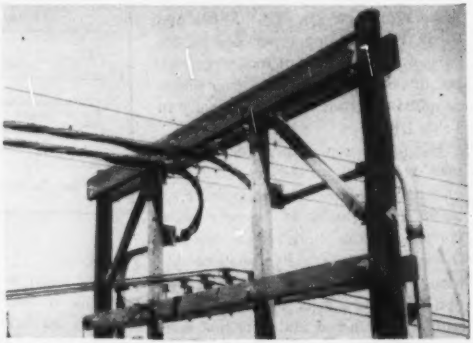


DEAD END STRUCTURES were very heavy. Cables dead ended in alley were held by head guys to a second structure which in turn was guyed. Concrete butt pads were installed

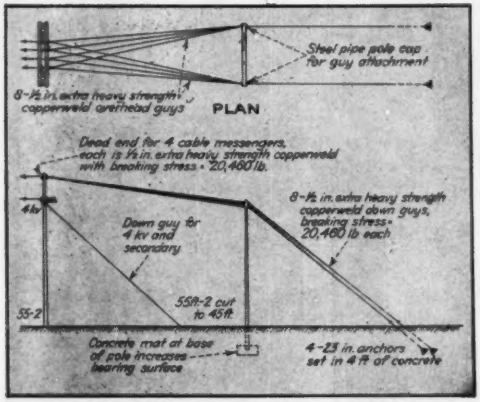
HEAVY STRESSES at deadends required special measures such as a cap on guy pole which takes heavy stress and provides four eye bolts for head guys and two eye lugs for down guys



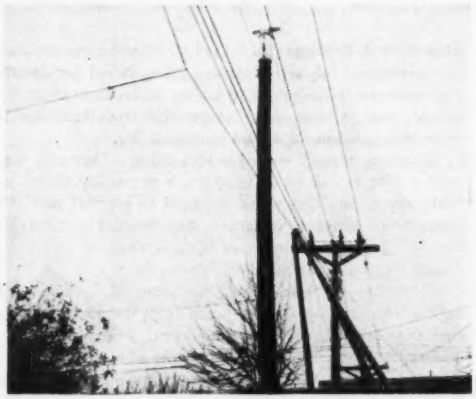
MESSENGER dead end structures are of heavy construction. Details are shown in drawing. Also shown are a transformer bank installation, 4-kv primary conductors and secondaries



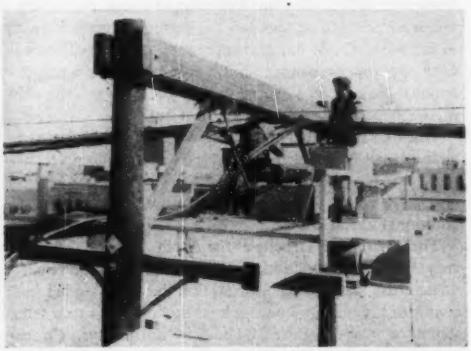
TRANSITION from aerial to underground cable is made in this manner. Conduit is brought up shady side of pole to reduce ambient temperature on cables during summer heat


Steel pipe pole cap for guy attachment
8-½ in. extra heavy strength copperweld overhead guys
PLAN
Dead end for 4 cable messengers, each is ½ in. extra heavy strength copperweld with breaking stress = 20,460 lb.
4kv
Down guy for 4 kv and secondary
8-½ in. extra heavy strength copperweld down guys, breaking stress = 20,460 lb each
55-2
55ft-2 cut to 45ft
Concrete mat at base of pole increases bearing surface
4-23 in. anchors set in 4 ft of concrete

HEAVY STRUCTURES were required to support the ultimate of four aerial cables in the center of the alley. Racks for transformer banks were installed where considered necessary



CAPPED POLE is shown in place in overhead line. Due to excessive stresses on dead end poles, concrete mats are often installed under pole butts to counter balance bearing stresses



PLATFORMS were provided for splicers who were underground men and unaccustomed to working on poles 43 ft above ground. Platform is near top of H-frame type of structure

Add Distribution Capacity Quickly With Aerial Cable

How Amarillo used aerial cable in downtown alleys to postpone underground. System designed to grow into secondary network. Cost was less than that of expanded existing 4 kv. Neat appearance and reduced congestion resulted

R. F. McCLURE
Southwestern Public Service Company, Amarillo, Texas

Installation of 13.2-kv aerial cable in alleys paralleling the principal streets of Amarillo's main business district has provided additional capacity quickly, to keep pace with the city's growth, and flexibility for future conversion to a secondary network. Our decision to install aerial cable came after several distribution plans had been compared, and service was requested for an 800-kva load long before an underground system could be installed to handle it. Another serious objection to underground construction was the costs of underground services and customer's wiring changes.

Individual building loads had ranged up to 150 kva before improved office lighting and air conditioning "caught on." Afterwards they increased rapidly, several going to 500 kva. One, an 800-kva load, was a new high for the area and the schedule for connection required drastic speeding up of the program for increasing the distribution system capacity.

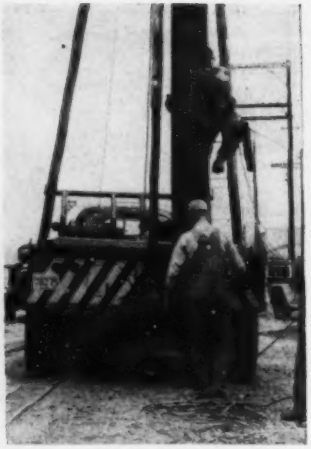
Two Choices . . . Our choice lay between more capacity in the existing overhead open-wire system and aerial cable. Aerial cable meant less congestion, improved appearance, and a postponement of the day when an underground distribution system might be necessary. Two aerial cables were installed on H-frames in each of the two 20-ft alleys that ran the length of the main business district, a distance of eight blocks.

Existing distribution was 4-kv wye. Circuits were on H-frames in the alleys. These overhead circuits were fed by three blocks of underground cable out of the Tyler Substation which was supplied at 13.2 kv.

Expansion of the existing 4-kv system would have re-

SPECIAL HEAVY TRUSS spanned both railroad siding and alley where distance was 37 ft from pole to pole

HOISTING SPECIAL TRUSS, which was built on ground, was accomplished by utilizing truck and winch as shown



TRUCK with 50-foot gin pole moves into position to hoist heavy truss that spans both the alley and railroad siding

quired additional facilities all the way back to the plant, including more substation capacity. This would have:

1. Added to the congestion in the alleys.
2. Concentrated an excessive amount of power and equipment at one location, increasing the possibility of fault and the probable damage in case of fault.
3. Required conversion to 13.2 kv at a later date.

Investment in the 13.2-kv aerial cable installation after deducting salvage value of the existing 4-kv system, was less than the cost of expanding the 4-kv system. Also one voltage transformation was eliminated which should result in fewer failures, lower power losses, and less maintenance.

The time required for making repairs or changes on aerial cable made it desirable to provide facilities for sectionalizing the circuit to take out faulted section while at the same time maintaining service to customers. Several schemes that would permit this were considered.

Secondary Network Considered . . . The secondary network plan, although having several advantages, was eliminated because of high immediate investment cost. The 13.2-kv aerial cable loop scheme, with sectionalizing switches, was also ruled out because when the load in the loop gets above 2,300 kva the oil switch becomes somewhat of a hazard. If an employee should make the mistake of opening the loop circuit at near peak load, he might become involved in an oil fire in a vault.

The parallel radial primary system was selected with a view to having it grow into a secondary network eventually. This scheme uses the same equipment as that required for the aerial cable loop scheme shown. Besides its flexibility for growth into a secondary network it has the advantage that the oil switch is not in series with the line so it will not be so much of a hazard. However, should a transformer fail, or an oil switch get out of order, it would be necessary to cut the cable loose. During that time the loads would be served from the alternate cable, and the secondaries might be banked to feed the load area of the transformer in trouble.

Structures A Problem . . . Heavy structures were required for supporting the aerial cables. Plans called for installing cables in the center of the alley in order to clear fire escapes and to keep as far as possible from buildings to provide protection for cables in case of fire.

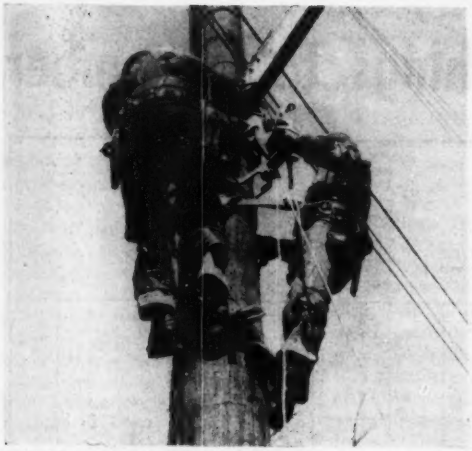
Structures provide space for four cables. They also support a 4-kv circuit of 4/0 copper, a secondary circuit of 4/0 copper, and they were designed to support two 500 Mcm aerial cable secondaries. The tangent structure is shown. Rack for transformer bank is included where required by field conditions.

Open wire secondaries will be arranged in a vertical plane. Service drops will be taken from the vertical members thus avoiding crossovers of drops. Primary and secondary transformer leads were made up of insulated cables, installed in conduit. This design makes structures safer for linemen. Also, it improves the appearance.

Connections between aerial cable and underground transformer vaults, or underground ducts, were made through conduit which was brought up the shady side of the pole. This was to reduce ambient temperatures on cables as much as possible in view of the extreme summer weather in the area. Cable hangers support the weight of the cable near the top of the conduit. Just above this point the conduit makes a 90 deg bend and goes toward the center of the structure where it ends in a bell.

One half inch extra high strength Copperweld messengers were placed between the aerial cables and the pole. They will protect structures against breaking in the event that an aerial cable breaks. In the future they will support additional aerial cables.

The dead end structure for these aerial cables is of very heavy construction. Ultimate strength of the four messengers was in excess of 80,000 lb. Dead ended in the center of the alley, they were held by head guys to a second structure which in turn was held by down guys. Concrete pads were installed under the butts of poles to take care of bearing stresses. A steel cap was placed on the guy pole to take heavy stresses.



GUIDING preassembled aerial cable over pulley made pulling-in operation easier. Pulleys were installed every 1000 ft. Pulling cable was ½ in. high strength flexible on 1,000 ft reels

Alley Construction . . . A special 37-ft truss was constructed to span the alley where a railroad siding made it necessary to set the poles 37 ft apart. The truss was braced with guys and struts to prevent its twisting. Cable messengers were installed on this truss with special devices designed for supporting them and to spread the weight of the messengers over the truss.

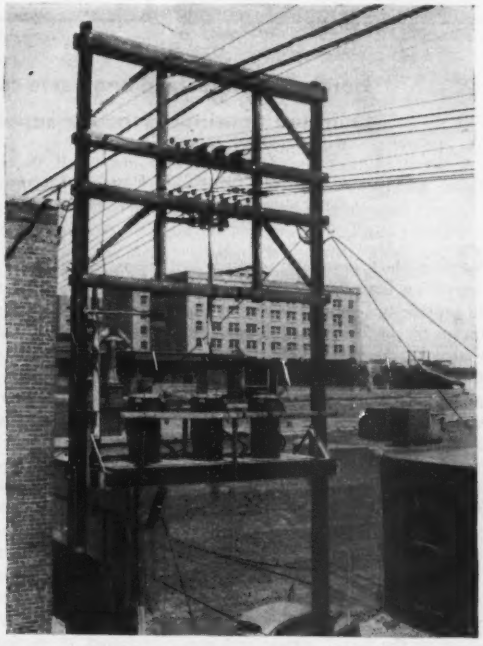
Aerial cable installed was preassembled and consisted of three No 3/0 copper conductors wrapped to a ½ in. EHS messenger. Stringing pulleys were installed over a 1,000 ft distance, the length of cable on a reel. A rope was threaded through and used to drag in the pulling cable which was ½ in. extra high strength flexible cable.

Two trucks then took their positions. A cable reel was placed on a specially built stand which was mounted on the bed of one truck. The reel was keyed to the axle of the reel stand. Rotation of the axle was controlled by a chain drive from the winch head. This arrangement enabled the operator to control the speed with which the cable unwound. At the other end of the 1,000 ft, a winch truck was placed to pull the cable.

The cable was raised upwards past the existing "hot" 4-kv circuit and then moved out to its final place near the center of the structure. This was accomplished by straddling the top beam of the H-frame with a short piece of pipe, then running the chain of a hoist through the pipe and fastening the two ends to the cable which lay in the stringing pulley. After raising the cable out of the pulley, the pipe was rolled along the beam with pinch bars. Then the messenger was placed in the suspension shoe.

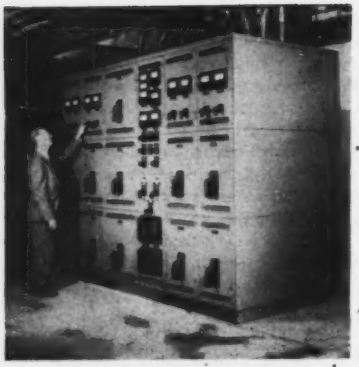
Cable splices were made by the underground cable crew. As this crew was not used to working 43 ft above the ground, a large platform was built near the top of the H-frame structure. The cable shield was bonded to the messenger at the splices. The messenger was bonded to two ground wires which went to the foot of each pole.

OBVIOUS CONGESTION and poor appearance prevailed with old style transformer installation with open-wire construction



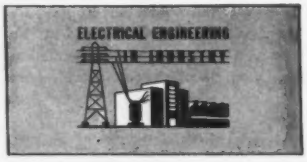
NEATNESS AND IMPROVED APPEARANCE resulted with new type transformer installations with aerial cable primaries

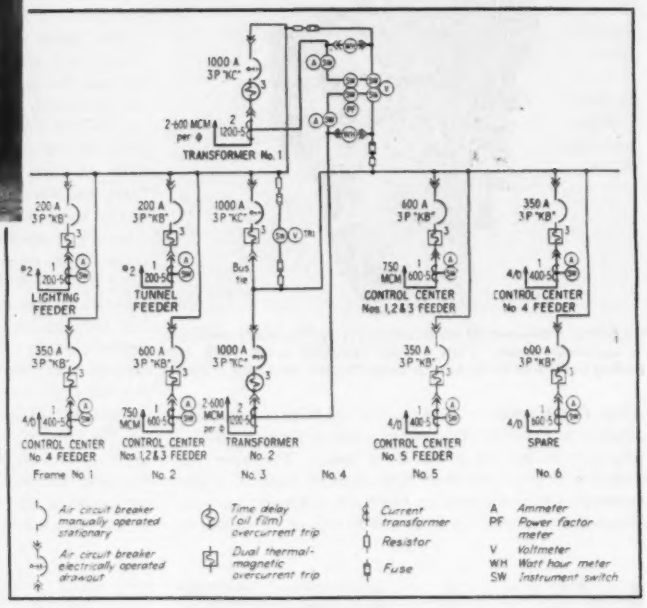
Things To Remember



SWITCHBOARD of drawout type having two supply sources. Operator can select either source as normal. Transfer breaker automatically connects bus to standby source when main source fails

SINGLE LINE DIAGRAM for switchboard is illustrated on this page. If specified, provisions can be made to automatically drop all nonessential loads if they overload standby source →





Here's how industrial engineers can specify bus transfer equipment to insure continuous power supply for plant distribution systems

AMADO CONANGLA, Electrical Engineer
I-T-E Circuit Breaker Company, Philadelphia, Pa.

One method generally adopted for improving the reliability of a bus is to provide two sources of supply and means for switching the bus from one source to the other. The additional source of supply may be just a separate step-down transformer fed from same incoming line, or a separate line, or a local generator. The switching operations necessary for disconnecting the bus from a dead source and connecting it to the standby source can be conveniently accomplished by means of air circuit breakers.

If the breakers are arranged for manual control, considerable time may elapse before an operator becomes aware of the power outage and performs the necessary switching operations to restore service. The outage time can be shortened if the breakers are controlled electrically from an attended location and alarms are provided to indicate source voltage failure. The duration of power outages can be reduced to an absolute minimum by automatic switching in response to voltage conditions. This type of control is often specified for main and tie breakers in switchgear equipments and unit substations.

The main function of an automatic bus transfer scheme is to open the normal source breaker and close the standby source breaker upon failure of normal source voltage. A scheme arranged to perform just this and nothing else is likely to prove unsatisfactory. It may be desirable, for instance, to prevent the transfer if the low bus-voltage condition is due to a fault, to retransfer automatically when the main source is reenergized, and to effect some subsidiary operation, such as sounding alarms when a transfer is completed.

A satisfactory transfer scheme starts with a clear and detailed specification of exactly what the scheme will be required to accomplish under different condition or sets of conditions. In order to prepare such a specification, the nature of the service and the conditions that are likely to be met during operation should be considered. For instance, if the standby source has a reduced capacity, it may be advisable to drop nonessential loads automatically after a transfer occurs. Switchgear manufacturers will design and build transfer schemes arranged

In Specifying Automatic Bus Transfers

to perform the automatic operations stipulated by the purchaser in his specifications, but they will not include functions not mentioned by the purchaser, unless obviously necessary.

It may take some time after switchgear equipment has been in operation to realize that the scheme fails to perform a desirable function or that it performs an undesirable operation. Although it is usually possible to revamp the scheme in the field and thus correct the difficulties, this is costly and may require a complete shut down. Therefore, a thorough study of the requirements should precede the preparation of specifications. The following discussion may be helpful as a check list of requirements to consider in writing specifications.

Normal Voltage Loss . . . This is the basic requirement. Loss of voltage on the normal source, when maintained over a prescribed interval, causes disconnection of the bus from this source and its connection to the standby source. This requirement is generally met by providing a time delay voltage relay to initiate breaker tripping and closing operations. Instantaneous voltage relays are generally not adequate for this application as they would cause transfers upon momentary voltage dips caused by feeder faults or by the starting of some large motor. A time delay voltage relay permits "riding" over momentary voltage dips and also provides a desirable interval to permit discrimination between failure of source voltage and low bus voltage due to a fault. The permissible outage duration should be specified after careful consideration of factors such as spoilage of material being processed, motor inrush currents upon reenergization, etc.

Low Voltage Trip . . . In a transfer scheme arranged to respond only to voltage conditions, transfers can be caused by a low voltage condition due to a fault. It is very important to specify whether automatic transfer under this condition is desired or not. It is possible to prevent the transfer and lock out the breakers until reset by hand, or to arrange for a one-shot reclosure from either the main or the standby source side, followed by lock out if the reclosure results in a new overcurrent trip. In any case, the provision to be taken for this contingency should be stated in specifications.

Return of Normal Voltage . . . The scheme may be arranged so that restoration of normal source voltage after an automatic bus transfer causes another automatic transfer back to the normal source. It may be desirable, however, to arrange the scheme so that manual operation will be required to switch back.

Choice of Operation . . . Due to unforeseen conditions that may arise in the operation of the system, it is sometimes desirable to defeat all or some automatic features at the operator's will. Provisions can and should be added to the scheme to permit selecting manual or automatic operation by simply turning a control switch handle to the proper position.

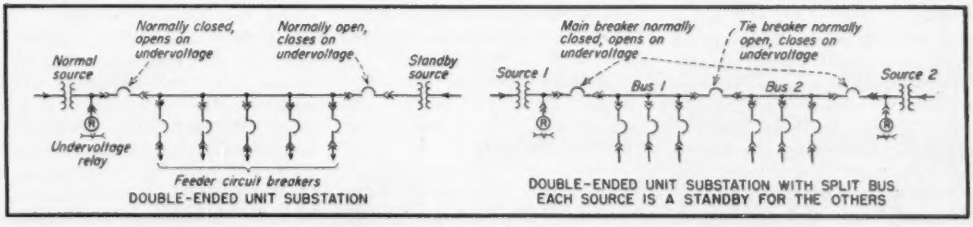
To allow flexibility in operation it may be desirable to establish at the operator's will which one of the two sources is to act as normal or preferred source. The scheme can be arranged to permit this selection. Alarms can be provided to indicate that a transfer has been completed, or prevented due to overcurrent, etc.

Interlock Prevents Paralleling . . . When the two sources are not in synchronism, or when their combined short circuit capacity is considered excessive, it may be necessary to provide interlocks to prevent paralleling during transfer or retransfer. When the transfer imposes an overload condition on the standby source, non-essential services can be sacrificed in order to supply essential services.

With selective tripping, a fault must be cleared by the breaker nearest it, and tripping of successive breakers between the fault and the source is purposely delayed to allow just this. Since an undervoltage will appear at the bus for the duration of the fault, the transfer should be prevented under these conditions for a prescribed time.

Control Power . . . It is very important to specify whether an independent source of control power, such as a station battery, is available. When control power must be derived from the sources to be controlled by the transfer scheme, the availability of that control power will be affected by the same conditions that would cause a transfer. Since a transfer cannot be effected unless control power is available, the scheme must include means for transferring the control bus as well as the main bus.

After carefully considering all of the above requirements and deciding which are desirable a brief description of operation should be prepared.



CONTINUITY of power supply is extremely important in design of industrial distribution systems. Outage time can be reduced to a minimum by automatic switching of electrically controlled breakers in response to voltage conditions

FIRST PLACE WINNERS from area high schools were judged in finals. First and second grand prize winners are held in right and left hands of Central Hudson's William P. Darrow. Over 34 lamps were under consideration in final competition

MAKING UP their minds, Judges Waterman and Caverly ponder score sheets. Judge Green's pondering is completed

CONGRATULATIONS to James Locasscio of New Paltz High School, one of first place winners, from Mr. Darrow

Lamp-Making Contest Makes New Friends

V. E. SHEPHERD, Central Hudson Gas & Electric Corp, Poughkeepsie, N. Y.

Focus of Central Hudson's long-range plan to improve customer relations is the youth of the Hudson Valley area it serves. Last March the company organized and sponsored a lamp building contest in every one of the 34 high schools in its 2,500 square mile area. Over 1,600 lamp wiring kits—socket, cord, harp and lamp—were distributed to industrial arts and woodworking classes, and the contest was set up to include every boy who wished to enter from each of the high schools.

There were prizes for the best three table lamps made in each school. High school faculties selected the winners and the first place lamp from each school was entered in the finals.

May 18 was the deadline for lamp completion. Over 1,500 high school boys went to work. Some schools didn't have woodworking tools, but enterprising students turned out lamps in home workshops.

By deadline the boys had built enough handmade lamps to light up the whole valley. They ranged from slick inlaid wood models to gleaming brass ones. They included lamps made from golf balls, shell cases, an old-fashioned telephone, drift wood, china, copper, and many other materials.

Some were simple. Some were ornate. All of them showed a lot of work. One of the final judges described the winners from each of the 34 schools as "worthy of the Museum of Modern Art."

Selecting Winners . . . A Central Hudson representative and photographer toured the area schools and photographed winners and lamps for local papers. The three winning lamps from each school were then displayed in the Central Hudson offices' show windows for one week.

One anxious contestant who had planted ivy in the base of his lamp called the company office regularly to make sure the plant was being watered. The boys and girls were proud of their work. So was Central Hudson.

To ensure objectivity and expert analysis, experienced lighting men were called in to do the final judging. They were Harold H. Green, General Electric Lamp Department; Marshall N. Waterman, Westinghouse Lamp Division and Donald P. Caverly, Sylvania Electric Products, Inc.

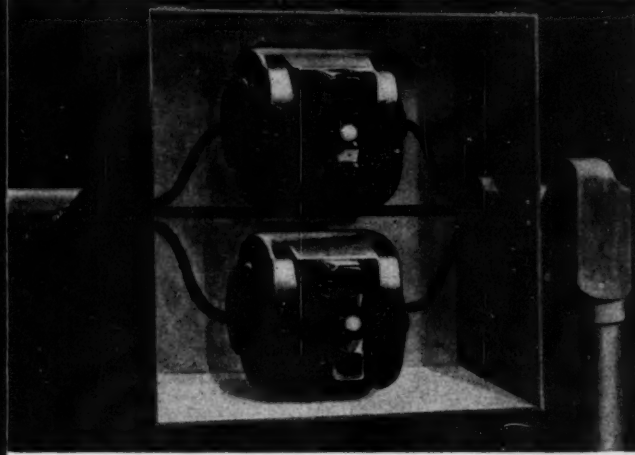
To make sure every lamp was given an even break a special scoring sheet was designed. A point system was used based on: conformity to specifications, lighting efficiency, general proportions, appearance, practicality, originality, craftsmanship and material.

On the day of the final judging the 34 lamps were assembled at the general office of Central Hudson in Poughkeepsie. No names were on the lamps—tags numbered from 1 through 34 were attached. The three judges, using the scoring sheets, yard sticks, and light meters, took more than four hours to select the three winners.

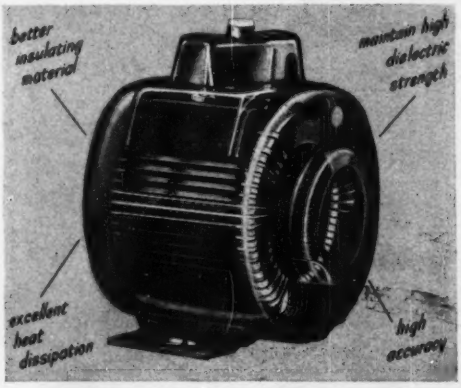
Awards were presented at Central Hudson and again pictures were taken and stories sent out to the valley newspapers, both dailies and weeklies.

The lamp contest cost approximately $1.90 for each boy. The investment in future customers was small, indeed, in proportion to the excellent relations that were developed, not only with the students, but with the high schools and communities. Most of these lamps were given to Mom and Dad and are now lighting up living rooms—a constant reminder of Central Hudson's interest in youth.

General Electric applies butyl-molding process to new line of...



Indoor-outdoor Current Transformers



INSULATION, SUPPORT, AND CASING are of molded butyl. Laboratory and service tests proved butyl resists weather—making single indoor-outdoor design practical, assuring dependable service.

New butyl-molded line reduces stock requirements—cuts inventory costs.

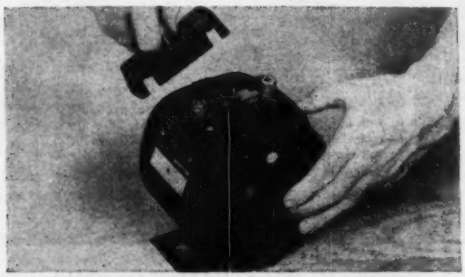
For the first time, you can buy a transformer for use *both* indoors and out. General Electric's new butyl-molded Type JKP-O can also be used as a three-wire transformer . . . another economy feature.

It can be mounted indoors on any flat surface . . . and in any position. Because secondary terminals are on top, transformers can be mounted close together. This makes them especially suitable for use in small boxes. When used outdoors, transformers can be installed on poles . . . without cross arms or enclosing boxes.

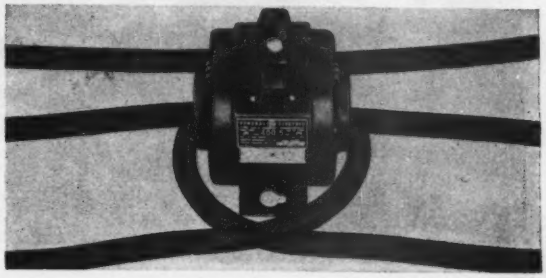
First of the line is the Type JKP-O . . . a 600-volt window-type transformer with primary ratings of 200-, 400-, and 600-amperes. For complete information, contact your local G-E representative or write Section 604-29 for Bulletin GED-1465. General Electric Company, Schenectady 5, New York.

GENERAL ELECTRIC

604-29



SECONDARY TERMINAL COVER cannot be put in place unless short-circuit switch is properly positioned—protecting personnel, equipment. The terminal block can be reversed for convenience.



WHEN USED AS THREE-WIRE TRANSFORMER, two conductors are passed through the window as shown. The extra-large, two-inch window allows easy insertion of full-sized primary cables for either indoor or outdoor installations.

Central Hudson Gas and Electric

Type FK-439 oil-blast breakers are available with interrupting time of 3 or 5 cycles, 20-cycle reclosing, interrupting ratings up to 5000 mva... voltage ratings 115 to 230 kv.

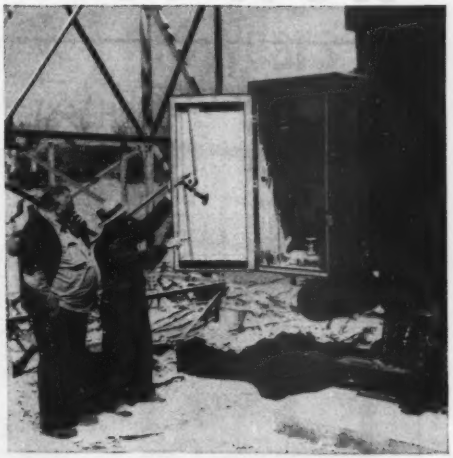
adds 33,000 kva of capacity

Type FK-439 oil-blast breakers protect new 110-kv system

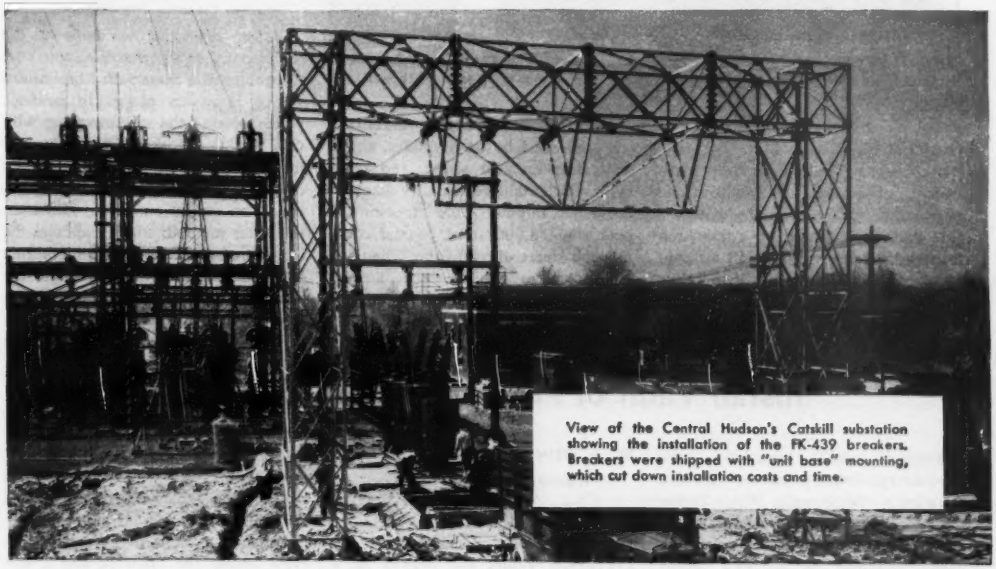
Recently Central Hudson Gas and Electric Corporation embarked on an expansion program to add 33,000 kva of capacity to its Catskill substation. Since plans called for changing high-line voltage from 66-kv to 110-kv, new circuit breaker equipment was necessary.

Company officials chose G-E Type FK-439 oil-blast breakers to protect the new installation. Multi-break interrupters and a dependable pneumatic operating mechanism provide high-speed performance and operating economy. Completely sealed bushings and accessibility of all internal parts simplify inspection and maintenance. Breakers were shipped with "unit base" mounting, which cut down installation time and expense.

Investigate these and the many other economic advantages to be realized when you use G-E switchgear on your system. Ask your G-E sales representative for further information on the FK-439 breaker, or write for Bulletin GEA-4407B, General Electric Company, Schenectady 5, N. Y.



Pneumatic operating mechanism is easily accessible. All working parts have an adequate margin of strength for safety and durability. Thoroughly tested and proved, built for dependable performance and operating economy.



View of the Central Hudson's Catskill substation showing the installation of the FK-439 breakers. Breakers were shipped with "unit base" mounting, which cut down installation costs and time.

GENERAL ELECTRIC

859-13

HOW TO DESIGN • CONSTRUCT OPERATE • MAINTAIN

TV Watches Smoke Emission at Waterside

TOPS OF STACKS are televised on screen (upper center) in boiler control room at Waterside so that operators may make proper adjustments to eliminate emission

Television has been put to work at Consolidated Edison's Waterside electric generating station in Manhattan, watching the stack discharge of the plant's ten boilers. The three Waterside stacks are viewed by a television camera located several blocks away in an eighth floor storeroom of the Kips Bay generating station of the New York Steam Corp. Pick-up unit consists of the camera with automatic iris controlled by an amplifier, signal generator, monitor scope, and regulator which stabilizes input voltage.

Image impulses are transmitted over some 3,000 ft of coaxial cable through street ducts to the Waterside Station where display scopes are located in each of four boiler control rooms and the superintendent's office. By means of these viewing screens the operators may constantly check stack emission, so that, if necessary, the proper adjustments can be made to improve combustion in the boiler.

The Kips Bay location, which is some 1,300 ft from the top of the stacks, was chosen for the camera because it was the nearest point on company property where all three stacks could be included in a single picture. Because the monitor scope at the camera shows the exact image being received at Waterside, adjustments in picture clarity can easily be made.

Present television installation was completed in February after extensive tests. It has good definition and operates under low lighting levels.

Previous Methods

Before recruiting television in the fight against excessive smoke emission, Consolidated Edison relied on various smoke observers placed in strategic places around the system, along with CO_2 and O_2 checks. Two photo-cell methods may well complement each other in the future in a more complete check on smoke emission. However, the latter method, which indicates the amount of smoke and fly ash emitting from a specific boiler through the stack, requires considerable maintenance to keep the lens free of soot.

Install Vault of Precast Slabs in One Day

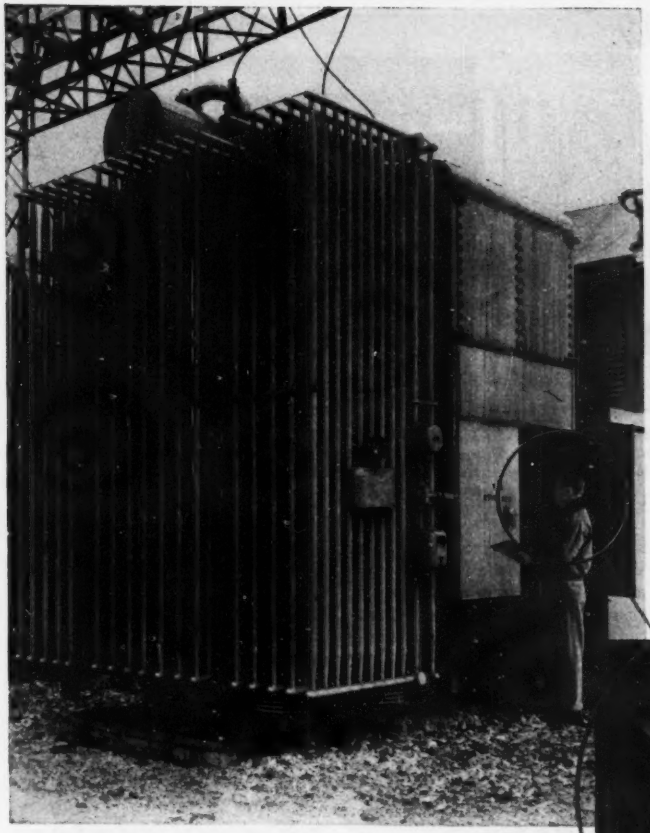
W. A. HEINECK and E. F. JOHNSON
Washington Water Power Co, Spokane, Wash.

Sidewalk vaults assembled from pre-cast reinforced concrete slabs are installed by Washington Water Power Co in one day, and at a slightly lower cost, compared to three weeks formerly required to excavate, build forms, and pour in place. The new vaults almost entirely eliminate the complaints of business establishments which justifiably object to having the sidewalk torn up and impassable any longer than necessary.

Steel-reinforced slabs for the 11x18x9-ft vaults are poured at a remote location about two weeks before installation, to allow concrete to set. Lifting hooks are cast in the slabs; they are burned off after the vault is assembled. Slabs, the heaviest of which weighs 17,000 lb, are loaded on two trailers by a 20-ton capacity truck-mounted crane in the reverse order from which they are needed on the job.

When a vault is to be installed, a crew breaks the sidewalk and a mechanical hoe makes the excavation, all of which requires about half a day. Vault slabs are brought to the site on two trailers, followed by the truck-mounted crane. The two side slabs are positioned first. By means of

Prediction: 14 years of tap changes without any servicing



General Electric transformer rated 6000/7500 kva, 33-kv, installed on Indianapolis Power & Light System. Load-ratio control in low-voltage winding provides ±5% voltage regulation.

This particular G-E transformer will operate 14 years at its current rate of 20 tap changes a day before its load-ratio-control equipment requires servicing. This means that for 14 years the maintenance crew will not have to clean insulating surfaces or filter the contactor oil! In fact, the contactor compartment need not be opened during this entire period.

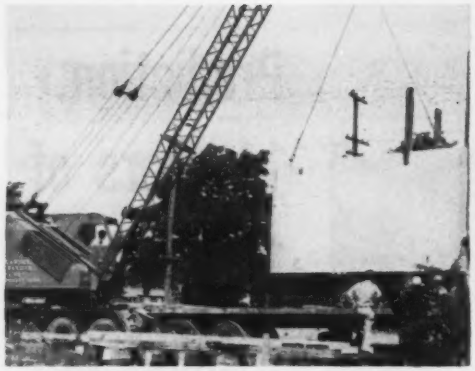
The really significant point, however, is this: We can tell you—and do tell you for each transformer—how many operations the LRC equipment will make before any servicing is required. We have tested the contacts of each design until we know, accurately, the life of the arcing tips. By the use of electrostatic shielding, and by having a major portion of creepage distances in the vertical plane, we prevent dangerous deposits of carbon from forming on insulating surfaces during this period.

In other words, with G-E load-ratio-control equipment, you don't do any *unnecessary* service work. You simply refer to the instruction book and read the counter to predict the time that servicing is actually required.

Over 37,000,000 installed kva have proved that General Electric LRC is as reliable as the core and coils themselves. Call on your G-E representative for a complete discussion on the LRC transformer best suited to your application. *General Electric Co., Schenectady 5, N. Y.*

401-18

GENERAL ELECTRIC



REVERSE ORDER LOADING of slabs for sidewalk vault facilitates rapid assembly at site. Heaviest slab weighs 8½ tons; 20-ton crane follows trailer to site and unloads and positions slabs as vault is assembled in place

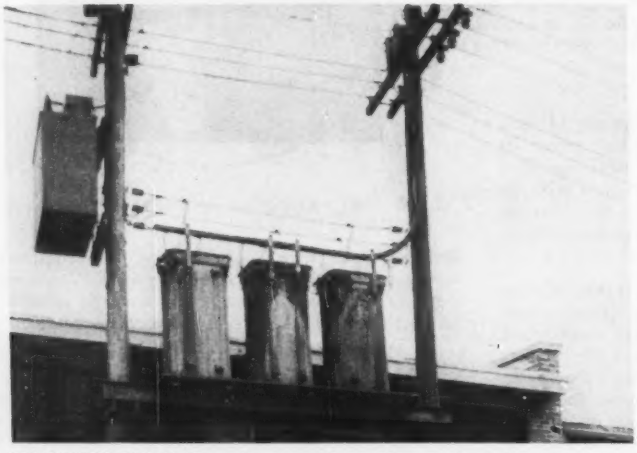
TIME TO COMPLETION is 4½ hr after hole is dug. Top slabs are put in place, temporary bridging to sidewalk installed, and traffic resumed the same day. Removable slabs in center will pass two 500-kva transformers

coffing hoists, the end slabs are butted against the lip of an L-groove extending from top to bottom on the inside of each end of the side slabs.

Hoists maintain alignment of the four sides until the slab frame, an H-frame with two cross members, is lipped into four tapered slots, as shown. Several slabs and two gratings are then put in place to form the vault top. After the vault is covered and temporary bridging to the sidewalk is installed, the vault interior can be completed without interfering with sidewalk traffic. This assembly operation requires only about 4½ hr.

Next step toward completion is back filling around the outside of the vault, replacing sidewalk and curbing, and building duct line out to the intersection manhole. The vault bottom is leveled to grade parallel to the sidewalk, raked so the bearing surface is fine particles, and filled with fine sand if needed. The floor, which is a 6-in. slab poured from pre-mixed concrete, can be poured at any time.

Clean Design Safeguards Transformers and Capacitors



SAFE INSTALLATION of transformers and capacitors serving industrial customers results from economical use of materials and open design in working area

Economical use of material in mounting a 300-kva transformer bank and a 120-kva capacitor bank had the additional benefit of a safe installation. This layout, which serves industrial customers of the Cambridge Electric Light Co in Massachusetts, minimizes opportunity for contact with the primary supply, leaving working space between poles unusually free. A tap down one pole to capacitor bushings also is well protected. Mounting of the capacitor bank on the outside of the left-hand pole, away from working space around the platform and on the inside of the pole itself, contributes to safer working conditions.

In this installation only two 35 ft Class 2 poles were used, with a platform on a frame of two 6 in. I-beams and four 4 in. channels attached to the poles. Two brackets support the capacitor unit. Four wooden crossarms carry one set of lightning arresters and primary fuse cutouts for the transformer bank. The 2.4-kv 3-phase primary is carried by the top arms, as shown in the upper center of the illustration. Conductors to the transformer bank are in 3-in. fiber U-guard conduit. Transfomer secondary connections run to an open-wire inter-pole bus carried by strain insulators at each pole and then through fiber conduit in a 600-v circuit to a secondary open-wire run along the outer side of the poles to overhead feeds of the immediate customers.

FOR HIGH VISIBILITY on heavy-traffic streets

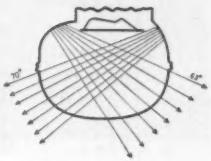
FORM 109

For the highest relative visibility—on heavy-traffic streets with normal mounting practices—General Electric's Form 109 exceeds all luminaires we have tested. This is not just an enthusiastic interpretation from laboratory tests—it's backed-up by lighting engineers all over the country. No other high-level illumination luminaire in General Electric's history has ever had such immediate acceptance—backed by installations.

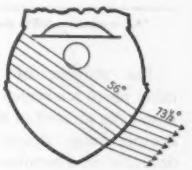
NEW DESIGN— The reason for this popularity is the basic design—the first new concept in recent years of street lighting. Now the long-sought, rectangular distribution pattern is a reality with the Form 109. Rather than modify the conventional round reflector and bowl refractor, G-E engineers developed a unique ovate reflector which not only directs light efficiently—but downward towards a rectangular pattern. There's a new triple-lateral reflecting principle to break-up the concentrated beam from the main reflector into three small eye-easing beams. The new Holophane® Vertilateral® refractor is slab-sided, presenting almost flat sides to the street—making light control more positive—assuring maximum transmission. An optical arc-centering magnet gives full life expectancy to mercury lamps.

This makes the Form 109 the only luminaire burning the economical A-H1, 15,000-lumen mercury lamp—horizontally. Designed as the answer to modern, mass-traffic problems, the Form 109 is bringing Comfortable Seeing on heavy-traffic streets to new, accident-free, traffic-moving heights. Get all the facts on this new, trend-making luminaire—write Section 452-114 or call your Apparatus Sales Office Lighting Specialist for application information. Apparatus Department, General Electric Co., Schenectady 5, New York.

® T. M. Reg.



Side cutaway shows the action of the main reflector—notice how on the near curb side, light is directed downward at a much steeper angle.



Vertical or lifting phase. Light is lifted and extended down roadway by the slab-sided reflector.

TRIPLE-LATERAL

Two accurately formed indentations in ovate reflector break-up main reflected beam into three soft, eye-easing beams.

STANDARDIZATION

109

TOP-TAPPED

PLAIN OR HEAT INSULATED SLIPFITTER

TOP TAPPED FOR FILAMENT

The Form 109 optical assembly can be hung from any of these hoods to use filament lamps. The Form 109 with either slipfitter or top-tapped mounting will burn filament lamps. The following lamps may be used. The A-H1 lamp requires the arc-centering magnet for horizontal operation.

Mercury A-H5 11,000-lumen

Mercury A-H1 15,000-lumen

Mercury E-H1 20,000-lumen

Filament 7" or 9½" L.C. series or multiple mogul base

GENERAL ELECTRIC

Control Cable Practice at 14 Stations

Table lists methods of installation for control cables composed of 2 to 16 conductors, together with conductor size, insulation and covering. These data were assembled by D. L. Greene of Gilbert Associates Inc, and presented before the Electrical Equipment Committee of Pennsylvania Electric Association

Control Cable Practice at Generating Stations and Substations

Station	Conductor		Each Conductor				Outer Covering		Installation		
	No.	Size*	Insulation	Wall, in.	Braid	Coding	Metallic Tape	Jacket	Location	Construction: Tray	Construction: Cover
A	2-4-6-8 10-14-16	10	Oil-base Compound	4/64	None	Numbers	None	Neoprene	Outdoor Indoor	..... Steel	..... Transite
B	2-4-6-8-10 12-14-16	10	"	4/64	None	Numbers	None	Neoprene	Outdoor Indoor	Transite Steel	..... Transite
C	2-4-6-8 10-14	10	"	4/64	None	Numbers	Zinc	Asbestos Braid	Outdoor Indoor	..... Steel	..... Transite
D	2-4-6-8-14	10	"	5/64	None	Numbers	Ambrac	Asbestos	Outdoor Indoor	Transite	....
E	2-4-6-8- 10-14	10	"	5/64	None	Numbers	Ambrac	Asbestos Braid	Outdoor Indoor	..... Steel	..... Transite
F	2-3-5-6 9-11	12	"	4/64	Cotton	Color	Zinc	Asbestos Braid	Outdoor Indoor	..... Steel	..... Steel
G	2-4-6-8 10-12	9	"	3/64	1/64 Neoprene	Color	None	Neoprene	Outdoor Indoor	Transite Transite	..... Transite
H	2-4-6-8 10-12	9	"	3/64	1/64 Neoprene	Color	None	Neoprene	Outdoor Indoor	..... Transite	..... Transite
I	2-4-6-8 10-12	9	"	3/64	1/64 Neoprene	Color	None	Neoprene	Outdoor Indoor	Transite Steel	..... Steel
J	3-5-7-9-12	10	"	4/64	Cotton	Color	Zinc	Asbestos Braid	.....	Steel	Transite
K	4-6-10-14 19	10 12	"	4/64	None	Numbers	Ambrac	Neoprene	Indoor Outdoor Indoor	Sides	Top-Bot. ....
L	3-5-7-9-12	10	"	4/64	None	Numbers	Zinc	Asbestos Braid	Outdoor Indoor	..... Steel	..... Steel
M	2-3-4 2-3-4 5-7	9 12	"	3/64	1/64 Neoprene	Color	None	Neoprene	..... Indoor	Steel Sides	Transite Bottom
N	3-5-6-7	10	"	4/64	Cotton	Color	Zinc	Asbestos	Outdoor Indoor	..... Steel	..... Steel

*All conductors AWG strand except No 9 which is 19 No. 22.

The number of conductors per cable up to ten seems to be most economically utilized in steps of two conductors each. Spare conductors are desirable in a number of circuits and the next larger cable size is often selected. The number of conductors per cable above ten are generally dictated by circuit requirements. For general all-around use No 10 standard strand conductor is selected.

Conditions involved in central station work generally run from very damp locations underground to comparatively warm conditions in the upper plant areas. One insulation that fits all these conditions is the oil base compound.

Practice indicates that for insulation on individual conductors the wall thickness should be a minimum of 4/64 in. consisting either of all insulation or 3/64 in. insulation with 1/64 in. neoprene. Make-up of outer jacket also has some bearing on the wall thickness.

Coding of individual conductors in color is convenient with the use of 1/64-in. neoprene. Also color can be readily obtained with cotton braid. Cables having no neoprene or braid covering may be coded with a stamped number for identification.

Outer jackets for the multi-conductor cable are made of neoprene or asbestos braid. Minimum thickness is 5/64 in.

A 5-mil spirally wound metallic tape is often used beneath the outer jacket. It serves to isolate any internal trouble and prevents faults being transmitted into adjacent cables. Ambrac tape may be used for either indoor or outdoor installations. Zinc tape is recommended for indoor installations only where dry conditions generally exist. It is subject to electrolysis under certain conditions.

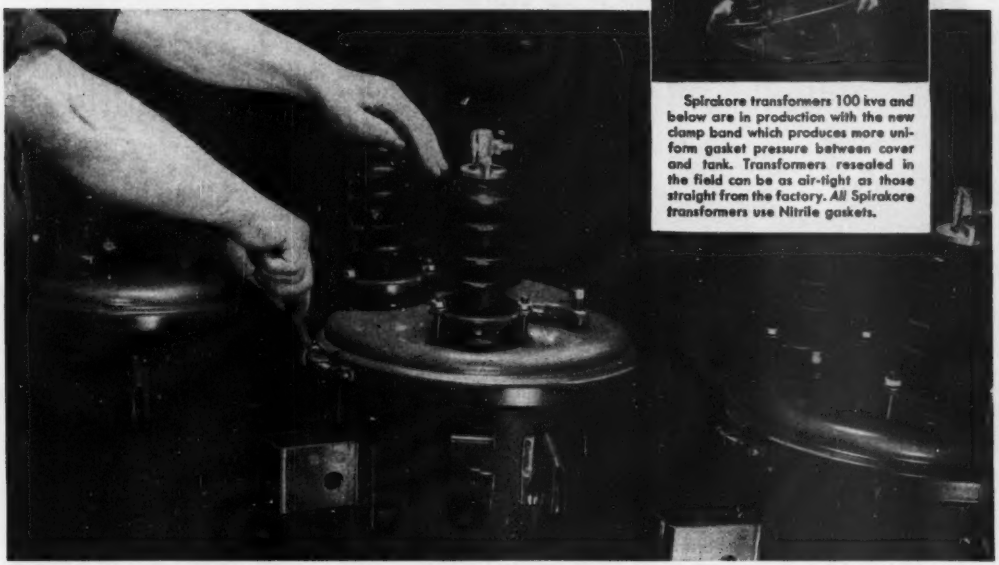
In the tabulation, most trays are sheet steel of varying widths and depths and having a transite cover. Some expanded metal prefabricated trays have been used in which case covers have been omitted. Gage of the steel varies from No. 18 to No. 10 depending on the cable load. Transite ¼ in. thick is used for covers and bottoms.

Complete transite trays have been fabricated using ¼ in. material on top and bottom, and ½-in. material on sides. Supporting members of angle iron or Unistrut are used for these tray installations. Rods and Unistrut suspend trays from building steel.

In some outdoor installations 6 in. and 12 in. factory formed transite trays are carried on Unistrut racks along the sides of a concrete tunnel.

New cover band makes seal on G-E Spirakore* transformers even better

Spirakore transformers 100 kva and below are in production with the new clamp band which produces more uniform gasket pressure between cover and tank. Transformers resealed in the field can be as air-tight as those straight from the factory. *All* Spirakore transformers use Nitrile gaskets.

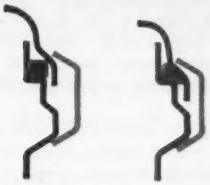


The cover on General Electric distribution transformers is now clamped against its Nitrile rubber gasket by a clamp band or ring. This produces uniform gasket pressure around the entire cover rim—results in even better sealing and resealing than ever before.

As in the past, breathing is completely stopped in G-E Spirakore transformers. Sealing is air-tight so that moisture-laden air can't be drawn into the tank to contaminate oil and shorten transformer life. Yet with this sealing, the new clamp actually improves accessibility. One bronze bolt holds the cover tightly in place. Loosen it, and band and cover lift right off. No adhesives to break—no surfaces to clean before resealing. You even re-use the same gasket.

Better sealing is only one of the reasons why Spirakore is the finest transformer you can buy. The full story is told in Bulletin GEA-5400. If you haven't a copy, write for one today. Address *General Electric Company, Schenectady 5, New York.*

*Registered trademark of the General Electric Company.



BEFORE TIGHTENING **AFTER TIGHTENING**

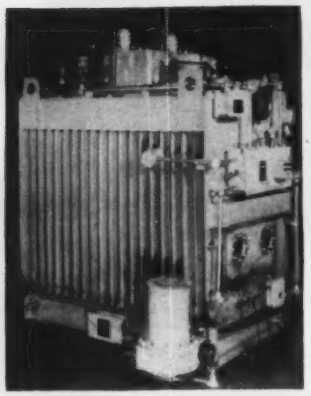
The brown represents the Nitrile rubber gasket which is of square cross section. The red is the new clamp band. When the band is tightened, the cover is drawn down against the gasket, compressing it and making an air-tight seal.

All openings—hand holes and bushings as well as cover—are sealed with Nitrile gaskets which are resistant to oil, age, sunlight and operating temperatures.

402-111

GENERAL ELECTRIC

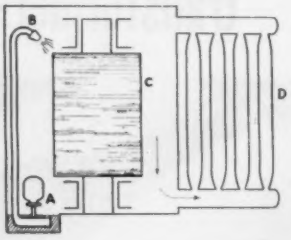
Vapor-cooled Transformer Will Be Safer and Lighter



TEST MODEL of 500-kva vapor-cooled unit is covered with devices used to obtain design data. Commercial unit will little resemble its prototype

VAPOR COOLING—How it works

Small pump (A) forces liquid fluorocarbon from sump to nozzle (B) where liquid is sprayed uniformly over core and coils. Liquid evaporates, taking its latent heat of vaporization from the coils. Fluorocarbon vapor fills space in tank (C), insulating transformer parts. Vapor moves to header and passes upward through cooling tubes (D) where it condenses. Condensate flows by gravity back to the sump. Condensation is accompanied by only a small change in temperature of the fluorcarbon, which remains near the boiling point throughout the system. Temperature of cooling surfaces is only a few degrees Centigrade lower than that of the coils. Temperature differential is much less than that in conventional liquid-immersed units. It is not necessary to mount coolers on transformer tank. They can be placed a reasonable distance away from the transformer.



A vapor-cooled, vapor-insulated transformer developed by Westinghouse Electric Corp is reported to have these characteristics: Weight reduction of 25% to 33% over liquid-filled units of equivalent rating and performance; reduced fire hazard because vapor coolant is not only non-inflammable but also fire-resistant; increased rate of heat transfer eliminates inherent limitation of size; and possible extension of voltage rating beyond present 15-kv ceiling for dry-type transformers because of superior dielectric strength of vapor coolant.

The new cooling technique is based on the use of high-molecular-weight fluorocarbons in spray form on the transformer core and coils (see illustration). These fluorocarbons have a suitable boiling point and heat of vaporization, and exhibit a high dielectric strength and impulse strength at low pressure. Fluorocarbons in a reasonably uniform field at atmospheric pressure are said to have a 60-cycle dielectric strength greater than that of transformer oil.

Of two vapor-cooled transformers so far constructed, the first was a modified standard dry-type unit. Equipped with adequate cooling capacity, it delivered more than 350% of its rated capacity, dissipating heat at ten times the normal rate for a dry-type transformer. The second test unit, a special 500-kva, 2,400—240-v transformer, has been operating at rated load since the first of the year.

Because of excellent heat transfer between coils and tank cooling surfaces, a more compact coil assembly design and reduced external cooling surfaces should be permitted in the new transformer. In addition it should be possible to utilize to better advantage copper temperature rise above ambient. Temperature at the external coolers has been found to be about the same as that of the coils. Coolers can be located at a reasonable distance from the transformer.

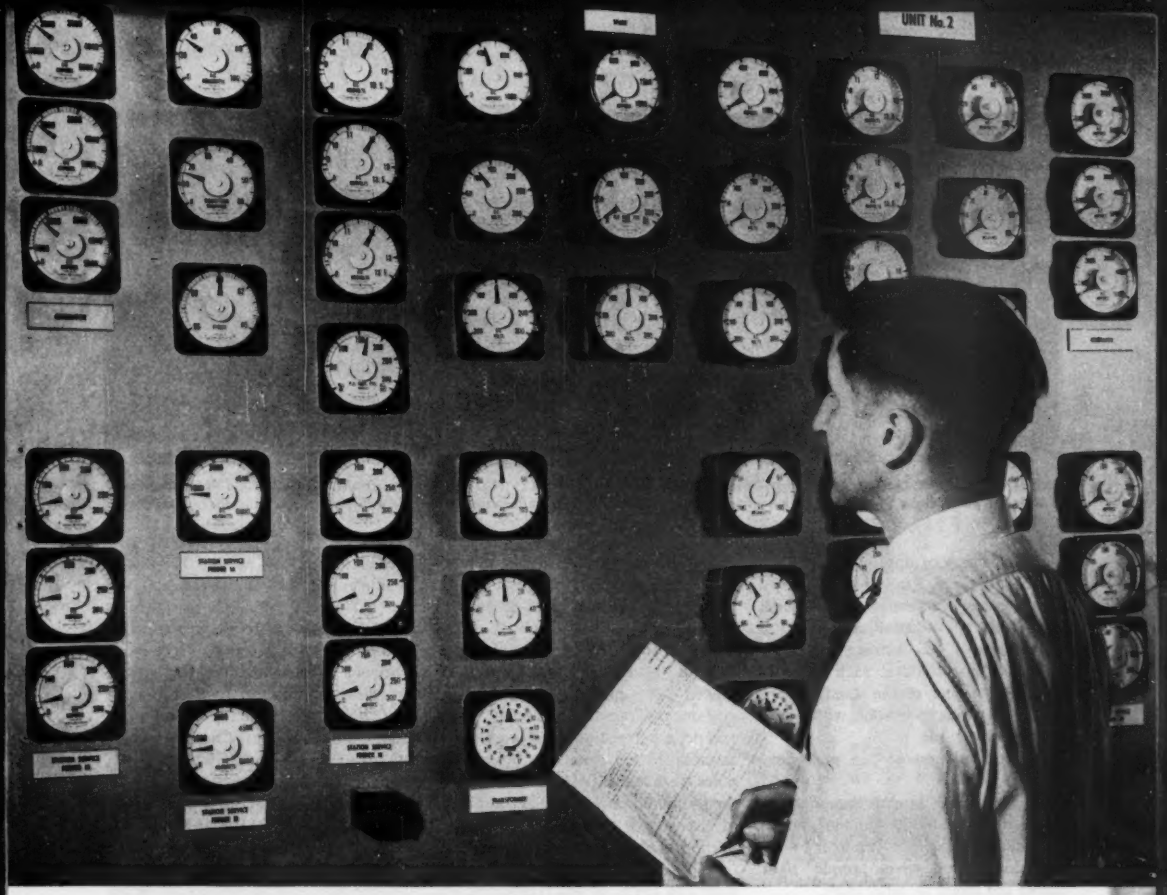
Even though only a fractional amount of fluid is used in vapor-cooled transformers as compared to liquid-immersed units, the present high cost of the fluorocarbons may result in a unit that actually costs more than a liquid-immersed type. It is expected that a fractional horsepower motor will be used to drive a pump which vaporizes the liquid fluorocarbon. Losses due to this motor will be negligible with respect to the rating of its associated transformer.

New Street Lighting System Saves Pole Bases

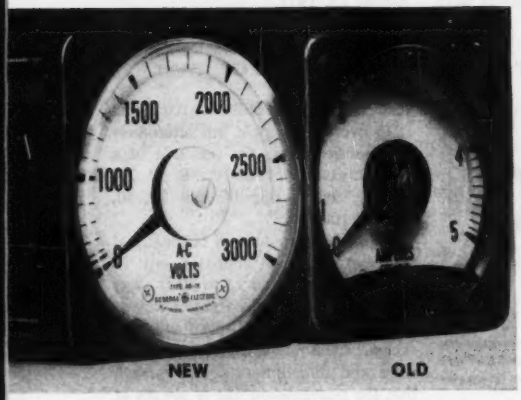
PAUL E. WIDENOR
Lighting Engineer
New Jersey Power & Light Co
Dover, N. J.

With minimum inconvenience to the public, a new street lighting system was completed in May 1951 on the main business street in Dover, N. J. The system was "sold" after the utility company erected a trial installation consisting of aluminum poles with prismatic luminaires and 15,000 lumen incandescent lamps. Forethought in laying out the previous lighting system permitted use of the same lamp spacing, foundations, and circuit cable with very few alterations for the new lighting in this typical industrial town.

A total of 72 aluminum poles were installed, each with a transformer base and an 8-ft long up-sweep arm, giving a 28-ft height from the black-surfaced roadway to the center of the light. In the more congested section (approx 2500 ft) of the street 45 standards carry 15,000 lumen lamps. Here the amount of light on the black surfaced roadway is calculated to be 2 ft-c.



See How Easily You Can Read These Instruments



COMPARE THE READABILITY and see the improvement in G-E shadow-proof instruments. Both are lighted from above. Note how much easier you can read the new dial.

That's why Delaware Power & Light recommended new General Electric shadow-proof instruments

When Delaware Power and Light built its new Edgemoor Generating Station, the company specified G-E shadow-proof instruments for the control room. They indicate performance of two generators, excitors, amplidynes, and transformers.

These instruments were selected because they are so easy to read from almost any angle. The dial is set forward, flush with the front of the case. A protruding convex-type glass front provides clear illumination. No more cover overhang; no more shadows caused by overhead lighting.

You can obtain shadow-proof instruments in both 4¼- and 8¾-inch sizes as ammeters, voltmeters, and wattmeters; frequency and power-factor meters; temperature indicators and synchroscopes.

Specify G-E shadow-proof instruments for your control stations, testing devices, and other installations. Ask your G-E representative for more information or write Section 602-211 for Bulletin GEC-218B. General Electric, Schenectady 5, N. Y.

GENERAL ELECTRIC

602-211

PRISMATIC LUMINAIRES with 15,000 lumen lamps on 7 aluminum poles light up 50-ft black-surface street

TRIAL INSTALLATION of aluminum pole and prismatic reflector contrasts sharply with pole-top luminaires in background

For a distance of approx 2400 ft, 22 standards carry 6,000 lumen lamps. In the congested section 44 standards are set at opposite positions spaced at an average of 100 ft along the curbs, with four standards at each intersection. Remainder of the standards are set at alternate positions with some spacings over 100 ft.

Electric equipment per pole consists of:

1. A 15,000 lumen incandescent lamp (or a 6,000 lumen lamp) mounted in prismatic luminaire with refractor which gives ample light across the street to other curb.

2. An IL transformer to supply the 15,000-lumen or 6,000-lumen 20-amp lamps, from the 6.6-amp series lighting circuit.

3. A series protector relay to remove the series regulating transformer primary if the secondary opens.

4. A disconnect type of pothead on the series circuit at each IL transformer. The 1500 cp (15,000 lumen) and 600 cp (6,000 lumen) lamps replaced 3-600 cp, 5-400 cp and 64-250 cp lamps. Foundations for the previous pedestal type of poles were found suitable for the aluminum poles. Steel poles were considered but the steel on the foundation was too heavy and bolts of the proper size could not be put in the foundation to hold the pole.

Cable for the series system was installed in 1925. It was remodeled and strengthened for the heavier load, thus avoiding cutting across the street to lay cables to lamp poles on the opposite curb.

Three and one-third standards were installed per day on the basis of a 5-man crew, but no installation was left unfinished in the evening. The operation included disconnecting the old circuit at each old pole, removing the old pole from foundation, dismantling, and carting to storage, drilling holes in foundations, installing foundation bolts, erecting the aluminum pole, attaching the luminaire, connecting lamp circuit to transformer, relay, and series circuit. Overall time for the 72 standards was 744 man-hours. In the congested area traffic slowed the job somewhat but neither vehicular or pedestrian movement was obstructed.

The method for installing foundation bolts for the aluminum poles was outlined on p 154, Electrical World, August 13, 1951.

Numbering System Aids Aerial Patrol Observer

GEORGE W. TILGHMAN, JR.
Transmission Engineer
Eastern Shore Public Service Co of Md
Salisbury, Maryland

A numbering arrangement on transmission lines permits pole and trouble locations to be identified readily by an observer on aerial patrol.

Each digit is a porcelain unit having a black number 5 in. high (width varies) on a 6 in. high by 5 in. wide orange plate. The plate has a hole at top and bottom and is attached by brass screws to a pentachlorophenal treated ⅞ in. Douglas fir board. Three digits are mounted on a 17 x 7 in. board and four digits on a 22 x 7 in. board. The boards are attached by brass screws to poles.

PORCELAIN ON STEEL numerals are black against orange background and are attached to fir board with brass screws

Numbers and boards are arranged for horizontal reading but are mounted vertically on the poles. Attachment is to every 10th pole but alternately on opposite sides. On one side of a line the numbers read 10, 30, 50, 70, 90, etc, and on opposite side 20, 40, 60, 80, 100, etc.

Flying in open country is usually at 50 miles per hr, at approximately 30 ft above the line and 25 to 30 ft away from the side. Narrow right-of-way or obstructions alter the speed and distances. Each line is traversed on both sides and direction of travel is such that the transmission line is always at the observer's left.

Digit size and color contrast facilitate reading the numbers. Broken in-

(*Continued on page* 148)

Condenser Tubes must be... KEPT CLEAN

Newport shoots the brushes through the tubes with an air-water gun at 75 lbs. per sq. in. They come from the far end like projectiles. Another Revere contribution was to assist in the design of a target to stop the brushes without damage.

● Condenser tubes almost immediately acquire a film that protects the metal from corrosion. Such film is thin, and beneficial. If it does not form, the probability is that the wrong alloy has been selected. It is part of Revere's service to collaborate with you in selecting the alloy that will be most economical in the long run.

There is another and much heavier type of formation within a tube that impairs its operation, or shortens its life, or both. This is the deposition of foreign matter such as shells, which may cause erosion-corrosion effects, and the growth of organisms such as algae. The latter materially reduce heat transfer.

Take the case of the Newport Electric Corporation, Newport, R.I. Its condensers are cooled by harbor water, with the result that algae and other marine organisms coat the tubes, reducing efficiency, lowering the vacuum, and increasing fuel consumption.

This utility is exceptionally well managed, with a systematic tube-cleaning program. However, it found that brushes and rubber plugs used for cleaning wore out quickly. Revere took a close interest in this problem. One of Revere's customers makes nylon brushes for cleaning tubes in dairies, and it was suggested that a modification of these be tried. Results: over 300 tubes cleaned per brush, a much longer life than anything previously used, and a half-inch gain in vacuum, meaning dollars and cents saved in fuel.

Revere makes condenser tubes and plates in all the usual alloys, and is glad to collaborate not only in specification, but in other condenser problems, as this case history shows. We are only too glad to work with you on any matter involving condenser and heat exchanger operation. Our wide experience, and contacts with many industries will be made freely available to you. Write the nearest Revere office.

REVERE 150 YEARS

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

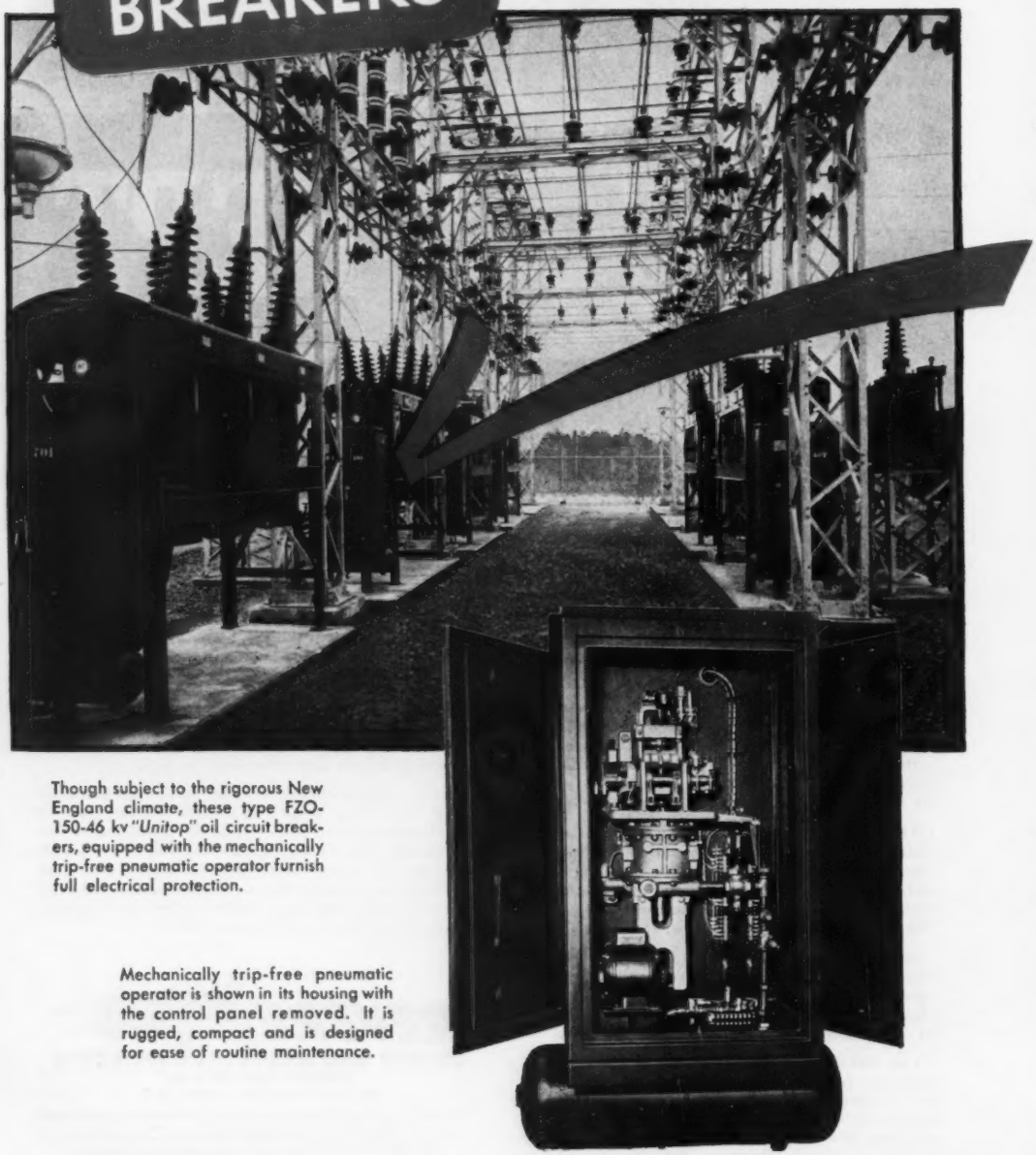
230 Park Avenue, New York 17, N. Y.

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N. Y.—Sales Offices in Principal Cities, Distributors Everywhere.

SEE "MEET THE PRESS" ON NBC TELEVISION EVERY SUNDAY

ALLIS-CHALMERS Outdoor OIL CIRCUIT BREAKERS

THE TREND



Though subject to the rigorous New England climate, these type FZO-150-46 kv "*Unitop*" oil circuit breakers, equipped with the mechanically trip-free pneumatic operator furnish full electrical protection.

Mechanically trip-free pneumatic operator is shown in its housing with the control panel removed. It is rugged, compact and is designed for ease of routine maintenance.

IS MORE AND MORE TOWARD

Mechanically Trip-Free Pneumatic Operation

MECHANICALLY trip-free mechanism and pneumatic operation have been combined successfully in Allis-Chalmers outdoor oil circuit breakers to furnish the high speed operation and reliability essential to *full* electric protection.

As the demand grows for circuit breakers of higher interrupting capacities and higher operating speeds, engineers have shown increasing preference for mechanically trip-free pneumatic operation.

Proved Advantages Combined

1. Powerful, instant breaker closing with pneumatic operation. Opening piston is normally in ready-to-close position for fast reclosing. Self-contained compressor and motor with air storage tank stores power for at least five closing operations.

2. Positive breaker tripping with mechanically trip-free mechanism. Contact mechanism is uncoupled from closing force and driven downward to open by powerful accelerating spring, assisted by gravity and free of any drag.

Pneumatic operation and mechanically trip-free mechanism are two individually proved features that date back to the early history of Allis-Chalmers oil circuit breakers. Their successful combination as a unit dates back for more than a decade.

To learn more about the advantages of mechanically trip-free pneumatic operation or breakers in the ratings you need, call your nearby Allis-Chalmers sales office. Or write Allis-Chalmers, Milwaukee 1, Wis.

A-3422

A-C ALLIS CHALMERS

ALLIS-CHALMERS

Mechanically Trip-free Pneumatic Operator Is Standard Equipment On These Allis-Chalmers Outdoor Oil Circuit Breakers

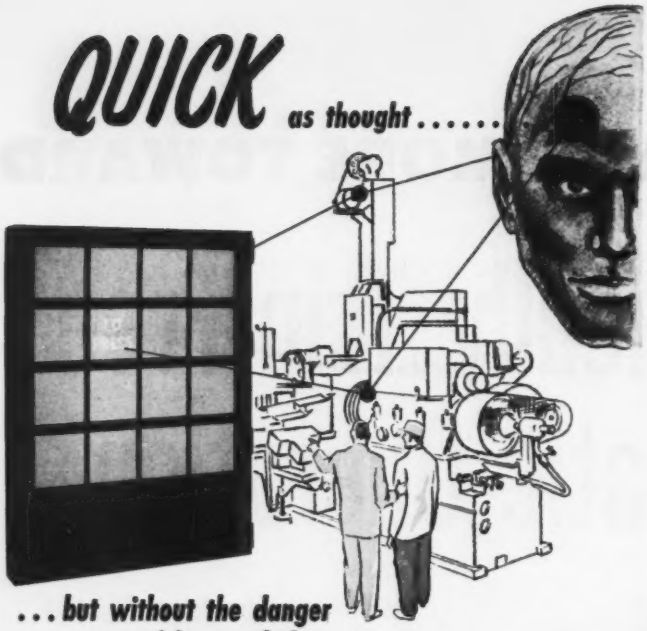
Type FZO-150 *Unitop* breaker 14.4 to 46 kv, 8-cycle opening, 20-cycle reclosing*

Type FZO-151 . . . 69 kv, 5 or 8-cycle opening, 20-cycle reclosing*

Type BZO-160 . . . 69 kv, 8 cycle opening, 115 to 230 kv — 3 or 5-cycle opening with 20-cycle reclosing*

Unitop is an Allis-Chalmers trademark.

*20-cycle reclosing standard for 600 and 1200 amp breakers



AUTH

SUPERVISORY ANNUNCIATORS
provide audible and visible signals that

- **PROTECT YOUR EQUIPMENT**
- **SPEED YOUR PROCESS**
- **SAVE YOUR PRODUCT**

Dependable AUTH equipment prevents costly breakdown of vital services or expensive equipment by giving insistent visible and audible alarms of such conditions as overheated bearings, low fuel level, high cooling-water temperature, low or high pressure, end of a processing cycle, etc.

AUTH SUPERVISORY ANNUNCIATORS work this way:

when trouble occurs, a supervisory annunciator receives an electrical impulse from a normally open or normally closed, momentary or maintaining contactor, such as a thermostat, pressure or float switch. This impulse is converted in the annunciator circuit to a maintaining circuit that operates a visible signal indicating the source of trouble, and simultaneously sounds an audible alarm. Various operations sequences are available.

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COMPLETE SYSTEMS • ONE RESPONSIBILITY

AUTH ELECTRIC COMPANY, INC.

34-20 45th St., Long Island City 1, N.Y.

MANUFACTURERS OF: Electrical Signaling, Communication and Protective Equipment for Housing, Hospitals, Schools, Offices, Ships, and Industry.

Numbering System

(*Continued from page* 144)

sulators, loose clamps and conductors, split poles, and other troubles have their location identified for the travel log by counting the number of poles to the next numbered pole.

Networks Shift Phase Without Attenuation

Three lattice networks have been designed which shift the phase of an applied sinusoidal voltage through a wide range by a variation in but one of the circuit elements and without a change in attenuation. Bridge-tee phase modulators, as the networks are called, have been used successfully in circuits related to radio telemetering, frequency modulation, servo-mechanisms and other applications where variable impedance control of phase is required. The networks were derived by Mr. M. G. Pawley of the National Bureau of Standards.

Major advantages of bridged-tee phase modulators are these: Push-pull circuits symmetrical to ground are not required; because there is no change in attenuation accompanying phase

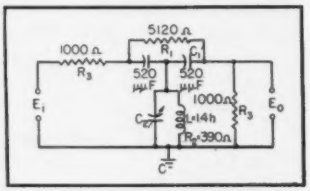


FIG 1—CAPACITANCE or frequency is varied in this circuit to get phase shift while attenuation remains constant

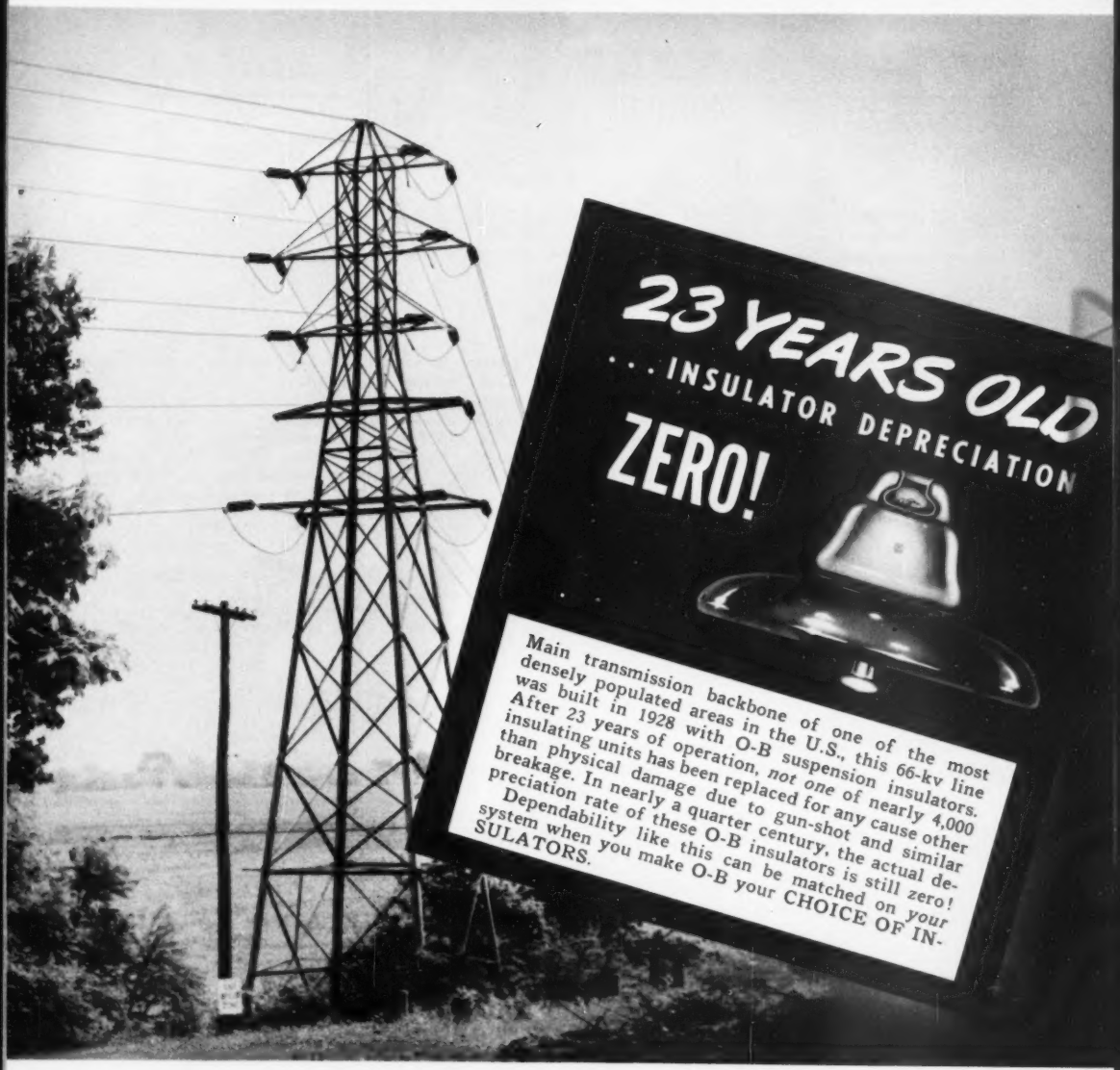
modulation, corrective measures following the phase modulating network are unnecessary; the networks can be loaded appreciably; and it is possible to ground one side of input or output and one end of controlling impedance.

Wide-range phase shift with constant attenuation is achieved by variation in a single control impedance. In one version, the circuit may be adapted for voltage control of phase, thus providing a simple and highly stable phase modulator useful in radio communication. The circuits function with a common ground and have the ability to work into low-resistance loads.

The modulator circuit shown in Fig 1 obtains a phase shift by varying either the capacitance C_2 or the fre-

(*Continued on page* 153)

HI-TENSION NEWS *Junior*

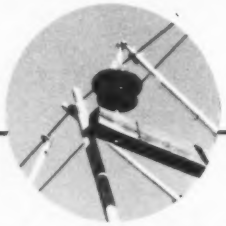

23 YEARS OLD
...INSULATOR DEPRECIATION
ZERO!
Main transmission backbone of one of the most densely populated areas in the U.S., this 66-kv line was built in 1928 with O-B suspension insulators. After 23 years of operation, *not one* of nearly 4,000 insulating units has been replaced for any cause other than physical damage due to gun-shot and similar breakage. In nearly a quarter century, the actual depreciation rate of these O-B insulators is still zero! Dependability like this can be matched on your system when you make O-B your CHOICE OF INSULATORS.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*

There's a HARD and an

EASY  way to tie an Insulator

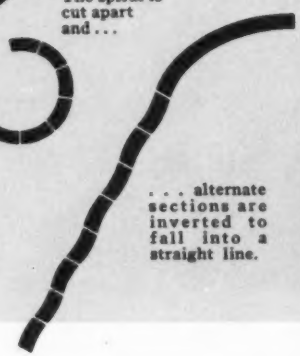
It takes three to five minutes to install a good hot tie. The charged end of the wire describes a large circle of danger around the insulator and conductor. The tool may slip or the end may go out of control; inviting trouble. And no matter how well put on, a hot tie won't stay tight and won't prevent conductor slip . . . Compare this with the Clamptop method. Spinning down two hex nuts with a simple hot stick wrench completes the installation--it's almost as easy hot as cold. The small clamping head is the only charged member and has no projections. When attached, this insulator has a permanent holding power of 2,000 to 2,500 pounds cantilever strength. . . Not only is the O-B Clamptop easier, it's a lot safer and a lot better than the old-time tie wire. Find this out for yourself with a trial quantity.

Straightening a Spiral

While it may not look like it, the clamping seat of an O-B Hi-Lite strain clamp is actually a true spiral--the most efficient of all snubbing anchorages. The sketch shows how this is done. Because of this spiral snub, the jaws don't have to crush the life out of a conductor cable merely to hold it. Hi-Lites develop the full working strength of the cable, with this grip subject to inspection at any time, and don't impose the penalty of cable damage. Conductors need never be cut. Continuous, unspliced jumpers are another Hi-Lite advantage. Top it off with low cost in both material and labor. Have you investigated what Hi-Lite strain clamps can do for you?

Approximate spiral on which the Hi-Lite clamp principle is based.

The spiral is cut apart and . . .



. . . alternate sections are inverted to fall into a straight line.

Precise Protection

In the final analysis, your lightning arrester dollar is invested in *protection*. The more sensitive the arrester, the more sure you are of this protection. . . The O-B Thorex arrester starts with very low average ratings and to these adds only +10 per cent sparkover and +5 per cent IR discharge tolerances; ultimately producing a protective device of the highest precision. . . Investigate what the O-B Thorex *really offers you!*

Cross-section of a typical Hi-Lite strain clamp showing the waved seat which is actually the linear projection of a spiral.

These sections are joined up into a harmonic wave which imparts a spiral snubbing action to a linear zone of cable anchorage.

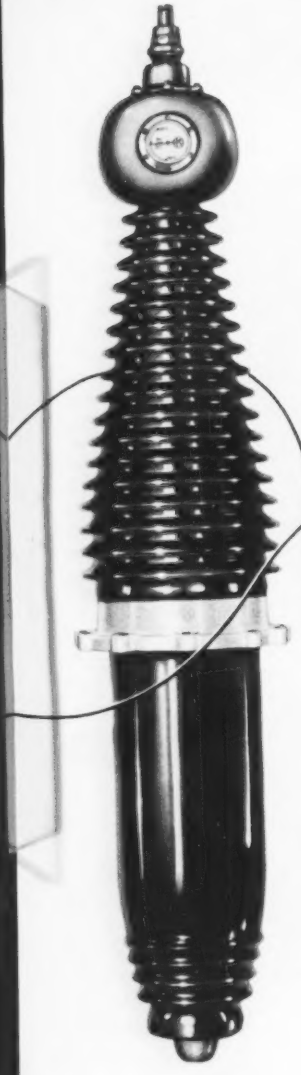
Look at the Facts!

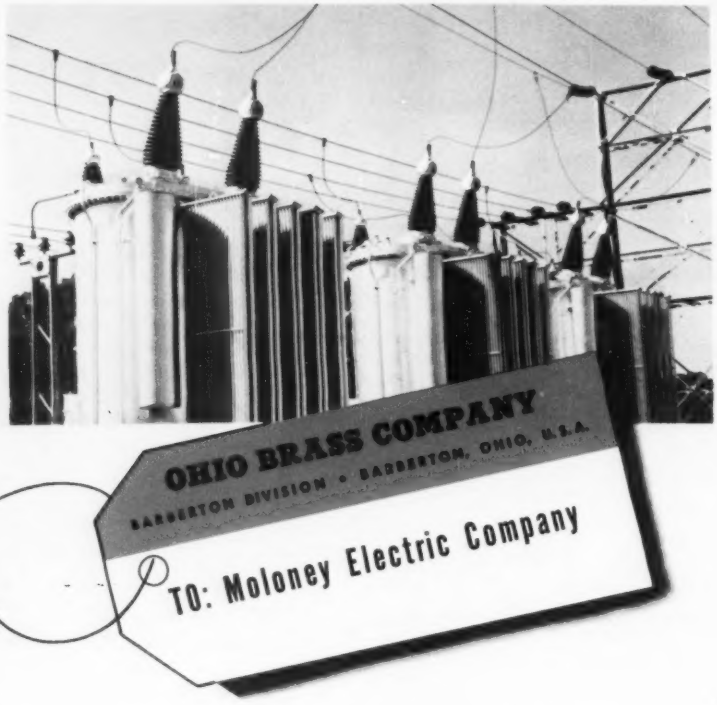
Remember this--there *is* such a thing as a bargain in station insulators, but it takes 20 or 30 years to know if you got it! Measured in dollars per year, station insulator prices vary widely. . . From their own records, many power companies have arrived at this conclusion. The result is continued repetition of orders for O-B that are influenced by *facts*, not conversation! When you specify O-B station insulators, time will prove you made a smart choice.

Ohio Brass

MANSFIELD, OHIO, U.S.A.

HI-TENSION NEWS *Junior*





Located in the primary substation of a large southern power company, these three Moloney transformers have been in service since 1942. According to the manufacturer, principle facts on this equipment are: "6,667 kva rating, single-phase, 60 cycle, 55 degree C temperature rise; high voltage--63,500/110,000 Y; low voltage--13,000/23,000 Y x 26,600/46,000 Y; tertiary voltage--13,200 Delta at 3,333 kva. Among other factors contributing to the performance and reliability of these transformers are . . ."

O-B BUSHINGS

One of the Finest Components of Any Transformer

Ohio Brass

MANSFIELD, OHIO, U.S.A.

4138-H

Networks Shift Phase

(*Continued from page* 148)

quency. Using circuit components as shown and an operating frequency of 4170 cps, circuit attenuation remains constant at 16 db and the phase shifts 90 deg as C_2 is varied from zero to 25 μμf.

With C_2 equal to zero this bridged-tee network functions as a frequency discriminator. As input frequency is varied from a few cycles per second to

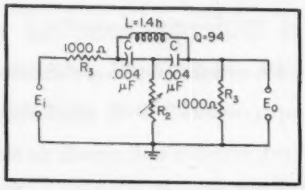


FIG 2 — RESISTANCE is the variable quantity in this bridged-tee network which shifts phase with no attenuation

approximately 8000 cps, the phase shifts nearly 360 deg while the attenuation remains constant. Phase characteristic is quite linear in the neighborhood of the center frequency.

Phase shift is produced in the network shown in Fig 2 by varying the resistance R_2. At a frequency of 4170 cps, attenuation is constant at 30 db. When R_2 is varied from zero to 10,000 ohms, phase shift is about 120 deg.

In Fig 3 the variable phase-controlling resistor R_2 of Fig 2 is replaced by a varistor including two germanium diodes. Consequently, a variable input control voltage modulates the phase. Static tests at 7250 kc indicate excellent linearity of phase versus bias voltage over a 90-deg phase shift. Nonlinear characteristic of the biased varistor compensates for nonlinear phase characteristics of the bridged-tee network, resulting in a remarkably linear phase response over the 90-deg range. As in the other forms of the network, the modulation is effected with no change in attenuation.

Bridged-tee phase-shifting circuits were developed originally for use with variable-resistance or variable-reactance telemetering pickup devices to produce phase modulation in multiplex time-division telemetering systems, and frequency modulation in multiplex frequency-division telemetering systems. The network illustrated in Fig 3 has proved successful as a phase-modulating unit inserted in the coaxial coupling between low-

(*Continued on page* 156)

CRESCENT

IMPERVEX TRENCHCABLE

TYPE RR

Your best answer for dependable underground cable at low cost

CRESCENT IMPERVEX TRENCHCABLE is a versatile low-cost, non-metallic armored cable for aerial and direct earth burial installations as well as for use in conduit and ducts, indoors and outdoors. The use of multi-conductor IMPERVEX TRENCHCABLE in place of multi-conductor lead-covered cable not only will show substantial savings in the initial cost of the cable but, because of its light weight and ease of installation, splicing and terminating will result in installation economies also. Even greater savings can be obtained when IMPERVEX TRENCHCABLE is used for direct earth burial as it does not require conduit or duct for such installations.

CONSTRUCTION

Insulation on each conductor is CRESCENT IMPERVEX, a special moisture-resisting, heat-resisting, long-life compound possessing excellent dielectric stability in the presence of water. Over the insulation on each conductor is applied a color-coded, moisture-resisting covering. The overall armor is a tough, vulcanized NEOPRENE sheath which completely fills the interstices between the cabled conductors as well as providing a protective sheath over the insulated conductors.

FEATURES

Lighter in weight, more flexible, easier to handle and install than metallic covered cables. No fibrous coverings to rot or deteriorate. The NEOPRENE armor is flame-retarding, resistant to impact, abrasion, grease, oils, ground water, soil acids and alkalies and practically unaffected by exposure to sunlight, air and weather.

USES

For light and power circuits for industry, utilities, mines, railroads, airports, ball parks, etc.

CRESCENT INSULATED WIRE & CABLE CO.

TRENTON, N. J.

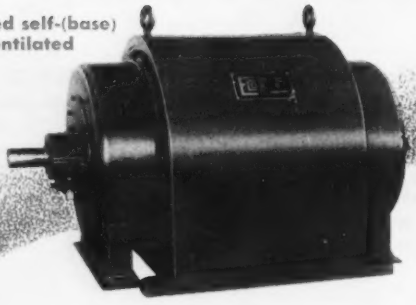
OVER 60 YEARS EXPERIENCE

How ELLIOTT fabri-steel fits the motor to

■ One of the many advantages of Elliott Fabri-Steel motors is the comparative ease with which motor enclosures can be devised, actually tailor-made to meet practically any reasonable operating condition. This unique adaptability is illustrated on these pages. It is applicable to all Elliott "Fabri-Steel" motors. Full information and data on request.

Modified frame
for top discharge

Enclosed self-(base) ventilated



Totally-enclosed, fan-cooled with top-mounted air-to-air heat exchanger

Totally-enclosed, water-cooled with side-mounted air-to-water heat exchanger

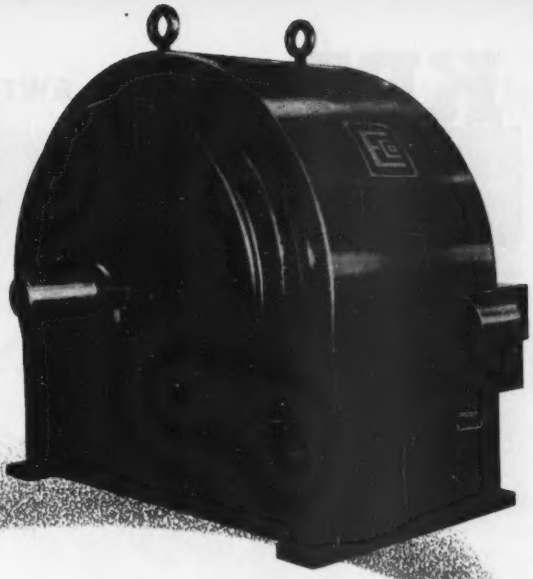
Elliott Company builds
a complete line of motors from 1 hp up.

1901 1951

ELLIOTT

Dept. EW • RIDGWAY DIVISION

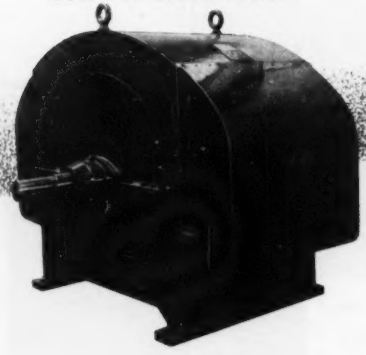
construction the need!



For instance, consider a standard, dripproof, squirrel-cage induction motor . . .

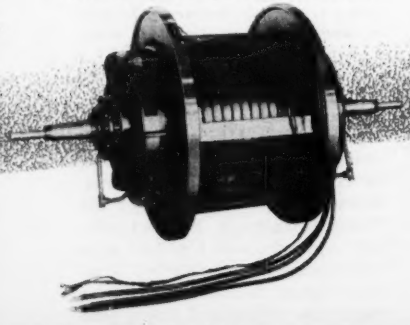
Without change in electrical design, this motor can be provided with enclosures ideally designed to meet the widest variety of special conditions, as shown in the following illustrations . . .

OUTDOOR SPLASHPROOF

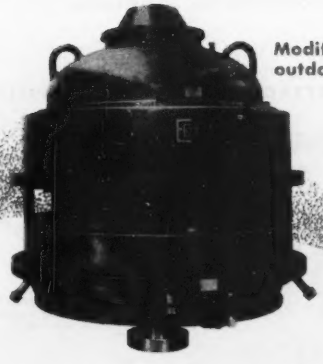


INDOOR SPLASHPROOF

Round frame for mounting inside a duct system with a F. D. fan drive on both tapered shaft extensions



Modified to a vertical outdoor splashproof design



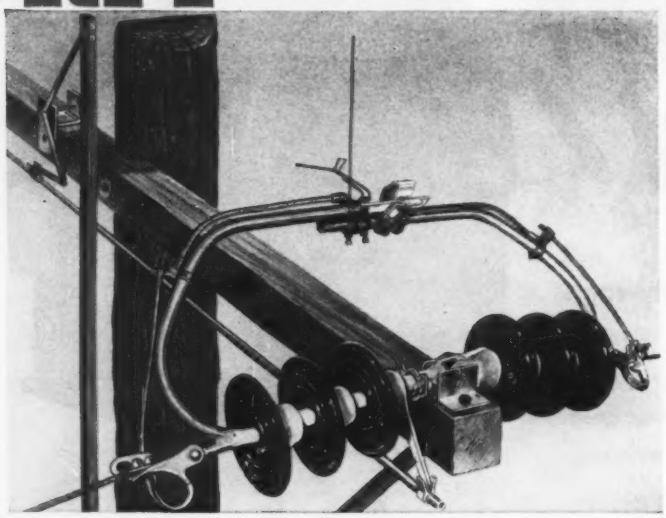
Elliott FABRI-STEEL MOTORS AND GENERATORS

L-817

Company
• RIDGWAY, PA.

PITTSBURGH, PA. JEANNETTE, PA. RIDGWAY, PA.
AMPERE, N. J. SPRINGFIELD, O. NEWARK, N. J.
DISTRICT OFFICES IN PRINCIPAL CITIES

KPF POLE TOP SWITCHES



Simple design means more switch ...for less money!

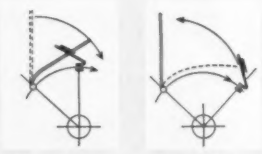
KPF Pole Top Switches cost less because they are simplest in design. They lower installation costs because they bolt on a single crossarm in minutes, require no extra insulators. KPF switches save, too, on upkeep; simple push-pull interphase rods never bind because of crossarm warpage; monel and bronze bearings never need lubrication.

KPF switches may be used in horizontal, vertical or triangular mounting. Free floating, self aligning blades and jaws maintain proper contact under all conditions of switch sag adjustment.

NEW QUICK-BREAK ATTACHMENT FOR KPF SWITCHES

The split-second breaking speed of these new KPF attachments means you can switch many circuits without using expensive circuit breakers. Attachment is available for all KPF switches rated 15 to 69 kv.

WRITE FOR DETAILS



Spring rod winds to full tension as switch opens.

Rod springs clear, breaking contact at high speed.

KPF ELECTRIC COMPANY
1624 E. Alpine Avenue • Stockton, Calif.

Networks Shift Phase

(*Continued from page* 153)

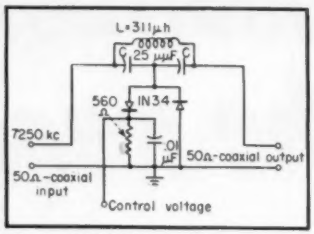
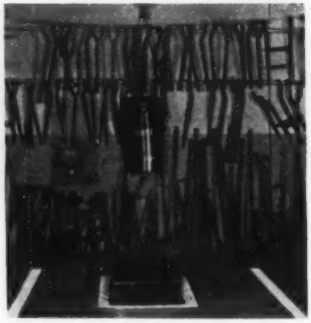


FIG 3—VARISTOR including two germanium diodes provides phase shift

level stages of a frequency-modulated high-frequency transmitter. In general, this bridged-tee phase modulator should be used in low-level applications in which attenuation does not incur a serious power loss.

For additional details see "Wide-Range Phase Control with Constant Attenuation by Adjustable Impedance in a Resistance-Loaded Bridged-Tee Network," by M. G. Pawley, J. Research NBS *45*, 193, Sept 1950 (RP 2123).

Safeguard Hoist Travel With Square Target



PAINTED TARGET on floor increases accuracy of spotting transformers by hoist operator working in storeroom above

Transfer of distribution transformers by hoist from one floor to another can be controlled closely by providing the operator with a target on which to spot his load. In a building on the United Illuminating Co system, where transformers are lowered through a hatchway, the hoist operator is provided with a painted white square with 34 in. sides and 4 in. wide strips on the floor below. Border bands 4 in. wide and 11 ft long were added to maintain an aisle 8 ft wide.

Here's Why You Get Extra Service with VICTOR TRANSMISSION PINTYPES

VICTOR Transmission Pintypes give extra long life because they're designed for severe service and made to rigid specifications. Each is thoroughly inspected at every point of manufacture. Performance data *proves* they furnish years of trouble-free service! Choose VICTOR—the finest insulators skilled craftsmen and modern methods can produce!

V UNEQUALLED STRENGTH! VICTOR'S de-airing process produces porcelain of maximum density, strength and resistance to impact.

V CUSHION COATED JOINTS absorb thermal variations and mechanical shock.

V SMOOTH, HARD GLAZE protects against weathering and contamination, assists self-cleaning, reduces maintenance and replacement costs.

VICTOR NO. 245 TRANSMISSION PINTYPE INSULATOR. For complete engineering data on this insulator and other sizes and types, write today for Bulletin No. 4.

V LARGE RADIUS TOP AND SIDE WIRE GROOVES make hot-tying quick and easy.

V QUALITY CONTROL! All shipments of flint, feldspar, and clay are stored in separate bins and tested for quality and purity before use.

V CONTROLLED TESTING and PROCESSING of cement assure highest bond strength at assembly joints.

V HIGHEST QUALITY WET PROCESS PORCELAIN gives unexcelled dielectric and mechanical characteristics.

Do You Know that...

VICTOR carries a complete line of transmission and distribution line hardware. These high quality products include aluminum, forged steel and malleable iron strain and suspension clamps as well as arcing horns, yoke sets and other allied fittings.

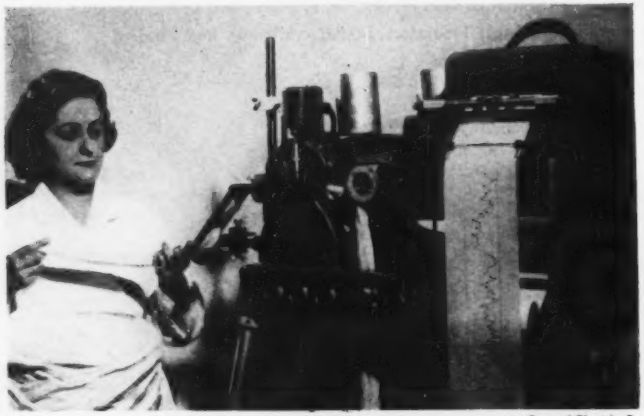
Specify

VICTOR

TRANSMISSION PINTYPES

VICTOR INSULATORS, INC. VICTOR, N. Y.

Photoelectric Recorder Speeds Yarn Testing



General Electric Co

YARN TESTER equipped with special photoelectric recorder eliminates older trial and error method and provides more accurate permanent record of yarn thickness

New equipment to test evenness and to determine the weight of yarn of every known fiber, natural or man-made, has been developed by the research laboratories of Pacific Mills, Lawrence, Mass. Eliminating older trial and error methods, the new tester determines actual fiber weight exclusive of moisture and oil content, without previous conditioning in standard atmosphere rooms.

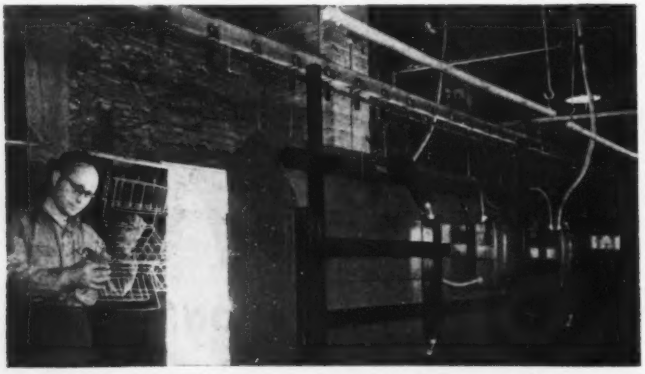
The unique equipment uses a special photoelectric recorder and other electronic devices. Manufactured by the Anderson Machine Shop of Needham Heights, Mass., the Pacific Evenness Tester provides a permanent record of yarn thickness at the rate of 12 yd per min. The unit was designed to test evenness, and to determine the weight of sliver, roving and yarn from 4.5 oz per 5 yd wool sliver to 100s worsted yarn, or the equivalent in any other fiber.

The sliver or yarn is fed into the tester through a set of tongue and grooved rolls. The bottom grooved roll is positively driven through a flexible coupling by a 36-rpm gear reduction motor. The top tongued roll is friction driven and is mounted on an arm, pivoted in a casting mounted on the base. The width of the grooves governs the capacity of the tester.

As the sliveror yarn runs between the top and bottom rolls, in the correct groove, variation in thickness causes a linear movement up or down of the top roll. This movement is converted into an electrical impulse by a special magnetic displacement gage, which in turn is measured by a micrometer, magnified and inked on graph paper by the special photoelectric recorder.

Infrared Quadruples Display Rack Production

G. H. McCARTNEY
Duquesne Light Company
Pittsburgh, Pa.



PROTECTIVE COATING on display racks is dried in 8 min in this 32-kw infrared oven. Former air-drying method required many hours, depending on humidity

The use of infrared heating has quadrupled production and saved space at the Milton Marks Corp, Pittsburgh, Pa. The drying of an aluminum protective coating on display racks, small transformer cases, and metal stampings was the bottle-neck in production. The paint was formerly air-dried by hanging the parts on drying racks. This method required a large amount of space and considerable time—oftentime days, depending upon humidity conditions. The 32-kw infrared tunnel now dries paint in approximately 8 min.

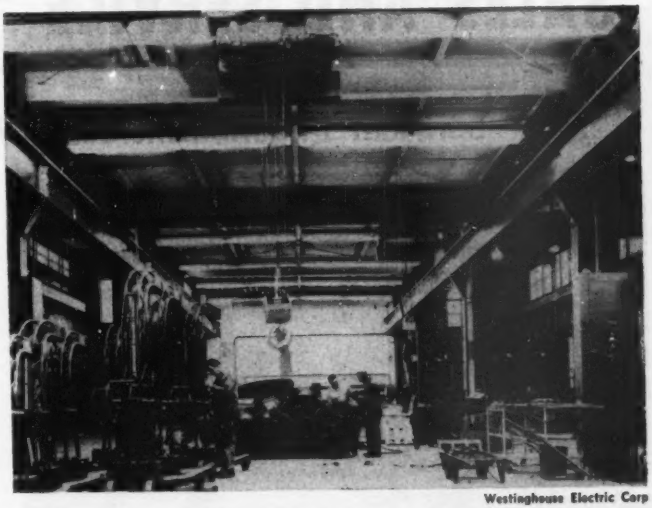
Planned Lighting Boosts Production

After 5 months operation a 50 ft-c planned lighting installation at the Hill Acme Co of Cleveland, Ohio, was found to boost production, save assembly time, and cut down errors and spoilage, according to Ray Haldeman, chief electrician at the plant.

Employees see faster and more accurately and morale is increased. Fatigue is reduced because less nervous energy is used in the work of seeing. The older experienced craftsmen are helped to do their best work. Halderman said that the new lighting system promotes better housekeeping. It makes dirt and rubbish easier to spot, and develops a desire to keep working areas clean.

The main high-bay-assembly area (not shown in picture) has three rows of 12 high-bay units each on seven and eight foot centers at a height of 35 ft. Units are lamped alternately with 450-w mercury lamps and 750-w incandescent lamps — providing 50 ft-c at working levels.

Maintenance of high-bay units is easily accomplished from a bridge crane. A dust-tight shatter-proof coverglass over each unit makes cleaning easy and keeps reflecting surface from becoming corroded or tarnished, assuring longtime lighting efficiency.



Westinghouse Electric Corp

CONTINUOUS ROWS of 2 lamp (85-w) fluorescent units mounted on 10 ft centers, 17 ft above floor provide 50 ft-c of high quality, shadowless light at working levels. Production and morale are increased; spoilage is reduced housekeeping improved

In side bay areas of the plant (shown in picture), continuous rows of 2 lamp (85-w) fluorescent units are mounted on 10 ft centers at a height of 17 ft—also providing 50 ft-c at working level.

Installation was made according to plans prepared by the Cleveland Electric Illuminating Co.

INDUSTRIAL BRIEFS

Wired Television saves manpower and promotes safety and quality control in the continuous casting of steel billets at Babcock & Wilcox Tube Co, Beaver Falls, Pa. Since the pouring operation is very critical, the mold must always be filled to an exact level in order to get good sound billets without spongy spots or air inclusion. Formerly it was necessary to station a man directly at the mold top to watch the pouring, ready to signal the operator 50 ft away. Now the TV camera is suspended above the mold and transmits an exact picture to the viewing screen in the control panel where operator watches pouring at close range with safety and comfort. Diamond Power Specialty Corp, Lancaster, Ohio.

Compound Softening by infrared lamps at the Hixon Battery Co, Savannah, Ga., has eliminated the hazard of blowups caused by previous open flame methods. A bank of six 250 w infrared lamps are arranged in two staggered rows—spaced about 2 in. from each other and placed approximately 4 in. above the batteries to be dismantled. Batteries are on an inclined roller conveyor which permits them to remain under the lamps for approximately 8 to 12 min, depending on the dexterity of the man pulling the cells. C. D. Anderson, power sales engineer, Savannah Electric and Power Co, Savannah, Ga.

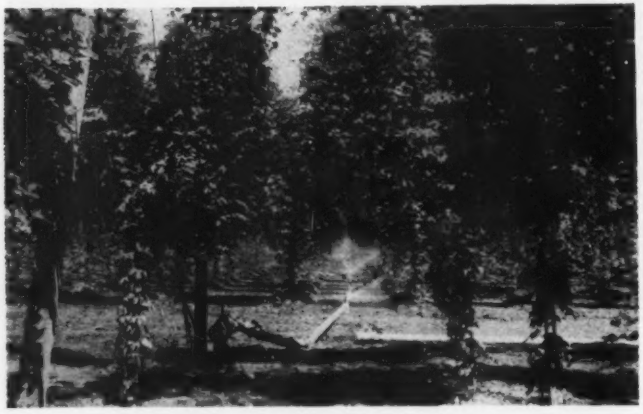
Electric Water Heaters installed in hot water storage tanks in washrooms of Continental Gin Company, Birmingham, Alabama, provide adequate hot water independent of central steam plant during light operating periods. This affords great saving during summer months when there is seldom need for steam. Automatic operation of electric water heaters requires no attention, and assures abundance of hot water. In each of the washrooms there is an 800 gal hot water storage tank equipped with three 7½ kw immersion heaters. R. E. Smith, Industrial Sales Dept, Birmingham Electric Co.

Label drying before molding of phonograph records is speeded at least 30% at the Allentown Record Co, Inc, Allentown, Pa, by use of infrared lamps. A bank of six 250-w lamps is mounted approximately 6 in. above drying table. Labels are placed in bulk in vertical position on table for 30 min. to 2 hr depending upon grade of paper, amount of ink, and relative humidity. Strength of paper is enhanced by removal of moisture so that label splittage is less likely to occur during compression molding cycle. Regular air-drying requires spreading of labels and might take from several hours to several days depending upon humidity.

SALES AND SERVICE

RESIDENTIAL • RURAL COMMERCIAL

Sprinkler Irrigation Increases Yield 50%



HALF AGAIN MORE YIELD with less time and labor results from changing hop orchard from basin to sprinkler irrigation. Special low angle sprinklers minimize interference from vines. Water is distributed by 900-ft strings of aluminum pipe

FELIX KARRER
Farm Power Adviser
Municipal Utility District
Sacramento, Calif.

Sprinkler irrigation has increased production by more than 50% on the King hop ranch near Sacramento, Calif. It has also solved a costly dust problem and cut time and labor required for irrigation by 50% and 75%, respectively.

Water for the system comes from two motor-driven deep-well turbine pumps. One is a 10-hp unit delivering 560 gpm; the other is 15 hp and delivers 900 gpm. Discharge of each of the pumps is connected directly to the suction side of 20-hp and 30-hp horizontal centrifugal pumps which boost the pressure to that required for sprinkling. The water then flows through 6-in welded steel mains 2,600 ft long. Risers are spaced every 56 ft along the mains to feed four 900-ft lengths of 4-in. and 5-in. aluminum sprinkler pipe. Special low angle sprinklers are used so the least amount of interference is created by the hop vines. These sprinklers require 20-ft spacing.

Use of the sprinklers effects a considerable saving in labor. Basin irrigation on the 62-acre ranch required nine men for 23 days. Sprinkler irrigation required only two men for 11 days. Better distribution and almost total elimination of waste water account for much of this reduction. Heavy tractor work for tillage and ridging and ditching through the summer months has also been almost completely eliminated.

Another advantage is a marked decrease in dust on the ranch, which aids in control of red spiders. Sprinkler pipe is placed immediately parallel to the main traveled avenues and the roadways are sprinkled lightly every day to keep dust down. Sprinkling forms a light crust on the ground surface, which tends to cement down the lighter dust particles even during relatively strong winds. Dust from the heavy tractor work required for ridging and ditching for basin irrigation is also eliminated.

One further advantage of sprinkling is the ease with which soluble fertilizers such as ammonium nitrate and ammonium sulphate may be applied without danger of being washed away.

Bonus Bulbs Campaign Builds Up Lighting Load

ROBERT L. COE
Residential Sales Manager
Union Electric Co
St. Louis, Missouri

Union Electric Co has just completed tabulation of results of a "Bonus Bulb" campaign that added 13,293.25 kw to the company's lighting load. Dealers sold six 60-w or larger lamps to the customer and gave them a 100-w bonus bulb in return for a coupon. The company reimbursed the dealer 17½¢, full retail price, plus sales tax.

Coupons were mailed to customers. Through the merchandise section, employees were offered a special package of lamps which could be purchased through the company's 23 retail stores. The large number of lamp dealers in the territory, 9,000, was a factor in the success of the campaign. These had been developed since 1946, when the company discontinued lamp renewals. Manufacturers' representatives visited each distributor and the larger dealers.

That the campaign did stimulate lamp sales is shown in the table. Load added was estimated at 13,000 kw. One special employee package was sold for each 3.5 employees on the payroll.

If conditions permit, another bonus bulb campaign will be conducted

(*Continued on page* 164)

Love letters to a lamp!

the GUTH 4-ft. SLIMLINE

"Here's to GUTH 4-ft. Slimlines! They're more profitable to handle and easier to store than the long 8-ft. fixtures . . . and I have far less loss from breakage."

Lighting Wholesaler
Pittsburgh, Pa.

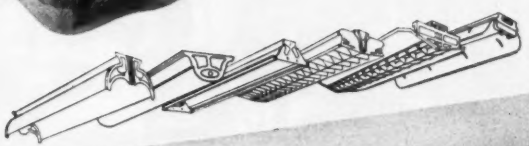
"I feel safer about specifying GUTH 4-ft. Slimlines. No more complaints from my clients because of the long, unwieldy 8-ft. lengths. Takes 50% less manpower to install and maintain."

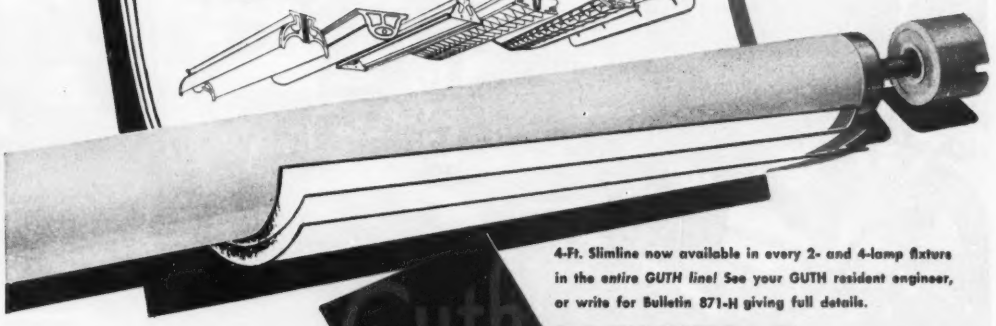
Lighting Engineer
St. Petersburg, Fla.

"My clients are still praising me for suggesting convenient, *short* GUTH 4-ft. Slimlines. Gives them all the economy and functional advantage of Slimline lighting without the clumsy 8-ft. length."

Architect
Los Angeles, Cal.

Last year we started out with both 4- and 8-ft. slimline — and 4-ft. has won by a landslide! Sales have zoomed higher than anyone had expected. Lighting men everywhere have fallen in love with GUTH 4-ft. Slimline. Here's what some say:





4-Ft. Slimline now available in every 2- and 4-lamp fixture in the *entire GUTH line!* See your GUTH resident engineer, or write for Bulletin 871-H giving full details.

LIGHTING

THE EDWIN F. GUTH COMPANY • ST. LOUIS 3, MISSOURI

Leaders in Lighting since 1902

Build for today

A modern installation of a Conduit and rigid conduit system in a streamlined metal working plant. Type RSM Junction Conduits provide for easy expansion . . . branch circuits can be added at any time by simply removing knockouts.

A Nationwide Distribution Through Electrical Wholesalers

... and tomorrow

A modern CONDULET* and rigid conduit installation gives you enduring protection

PLUS

the flexibility to meet tomorrow's needs

Type RSM Junction Condulets RS Series take 4 detachable hub plates with up to 3 hubs for conduit from ½" to 3½"

Type LF B Obround Condulet

Type LB B Obround Condulet

Type LL Obround Condulet

Type C Obround Condulet

Type U Obround Condulet

Type T Obround Condulet

Type BUF Mogul Condulet Mogul Series are for use where larger openings are needed for pulling large conductors

Type ARE Arktite Plug Receptacle

The most important consideration in an electrical installation is continuous plant operation through the years. Crouse-Hinds sturdy cast Feraloy CONDULETS and rigid conduit provide the best possible mechanical protection against accidental damage to electrical wiring and equipment.... prevent costly shutdowns.

Next in importance is flexibility to meet the needs of today's fast moving industry. A modern CONDULET installation provides for growth and changing conditions. CONDULETS with detachable hub plates make it easy to change circuits or add new ones at any time.

In addition to protection and flexibility, a CONDULET installation gives you these definite advantages:

- **ECONOMY.** The installed cost of Crouse-Hinds CONDULETS and rigid conduit compares favorably with other wiring methods. The added advantages make it the really economical method that pays dividends over the years.
- **SAFETY.** Ground continuity is of vital importance. CONDULETS with taper threaded hubs and rigid conduit with tapered threads make a secure joint that provides a reliable and permanent low resistance path to ground. This safety feature assures maximum protection against personal injury and fire.
- **CORROSION RESISTING.** Cast Feraloy CONDULETS give the best protection wherever moisture, dust, or corrosive atmospheres are present.
- **UNIVERSAL APPLICATION.** You can install galvanized CONDULETS and galvanized rigid conduit under all atmospheric conditions and in all occupancies.
- **QUALITY.** The trademark CONDULET stands for the highest quality, reliability, and long life.
- **VARIETY.** More than 15,000 items are listed in the CONDULET Catalog, including a complete explosion-proof and dust-tight line for use in hazardous locations.

On YOUR next electrical layout, plan to get all the benefits of sturdy cast Feraloy CONDULETS and rigid conduit . . . the universal wiring method.

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES: Albuquerque—Birmingham—Boston—Buffalo—Chicago—Cincinnati—Cleveland Dallas—Denver—Detroit—Houston—Indianapolis—Kansas City—Los Angeles—Milwaukee Minneapolis—New York—Philadelphia—Pittsburgh—Portland, Ore.—San Francisco Seattle—St. Louis—Washington. RESIDENT REPRESENTATIVES: Albany Atlanta—Baltimore—Charlotte—New Orleans—Richmond, Va. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

CONDULETS are made only by CROUSE-HINDS

CONDULETS · TRAFFIC SIGNALS · AIRPORT LIGHTING · FLOODLIGHTS

NEW

Coffing Challenger

What you have been waiting for in a Spur-Gear Hoist

Light Weight

Carry it with one hand. One-ton model, with coil chain for standard lift of 8 ft., weighs only 38 lb.

Ruggedly Dependable

Use it year after year. Long life is built in . . . sealed in. Housing is formed steel plate—will not crack under sudden shock loads. Back plate is laminated for extra rigidity. Hoist mechanism has sealed-in lubricant.

Safe

Trust it to protect men and equipment. Tested at 100 percent overload. All load-holding parts are special alloy steel. This hoist actually has a five-to-one safety factor.

Economical

Service it yourself. The Challenger may be completely disassembled in minutes with simple tools. No lost travel time to and from the factory for repairs.

Find out more about the all-new Coffing Challenger, available in ½- and 1-ton capacities. Write for Bulletin E9C.

COFFING HOIST COMPANY
Danville, Illinois

QUIK-LIFT ELECTRIC HOISTS • HOIST-ALLS • RATCHET LEVER HOISTS • MIGHTY-MIDGET PULLERS • DIFFERENTIAL CHAIN HOISTS • LOAD BINDERS • I-BEAM TROLLEYS

Bonus Bulbs

(*Continued from page* 160)

again this year. In the light of experience in the campaign just completed we would:

1. Prepare and pre-test a coupon that is readily recognized by the majority of customers as being a coupon of value.

WATCH FOR YOUR BONUS BULB COUPON
good for one 100-watt BONUS LIGHT BULB worth 17¢ with the purchase of six light bulbs
BUY 6... GET 7
SAVE...take your coupon to your light bulb dealer!

BONUS BULB advertisements in St. Louis and other nearby papers told customers that coupons worth 100-w bulbs would be mailed to them in the near future

2. Prepare dealers for participation more effectively by greater personal coverage of them in advance rather than relying largely on direct mail for this purpose.

3. Limit the campaign to a period of 10 to 14 days.

4. Offer a 150-w bulb in the new small size (A-23) as the bonus bulb in tead of the 100-w lamp.

Dealer and Employee Reaction to Bonus Bulb Campaign

Bonus bulb coupons mailed	427,049
Coupons redeemed by company	6,027
Coupons redeemed by dealers	19,650
Total coupons redeemed	25,677
Dealers who received campaign	9,496
Dealers who cashed in coupons	876
Coupons per dealer, average	22.4
Lamps sold	179,739
Minimum wattage sold	11,811.4 kw
Employee packages sold	1,434
Bulbs sold to employees, total	16,142
Wattage sold to employees, total	1,481.25 kw

Public Relations Is Problem and Opportunity for Utility

JOSEPH DeLEON
Public Relations Assistant
Seattle City Light

That municipally-operated electric utilities have public relations problems in some respects more complex than those of privately owned utilities has been recognized by Seattle City Light. In an effort to determine the extent of these problems, the second largest municipal utility in the nation participated this spring in an exhaustive study by an advanced public relations class at the University of Washington. Results of the study show clearly that an outside, disinterested group can survey and appraise local factors with a thoroughness and impartiality which are invaluable in setting up a positive public relations program.

Four Basic Proposals

By-product of the study, which occupied a whole class for a full quarter, was a comprehensive report recommending a fairly complete public relations program. To implement the recommendations for employee, customer, and community relations, the report made four basic proposals affecting management:

1. Elevate the public relation function to a management level.

2. Set up a program to build institutional good will as a continuing objective.

3. Give City Light more control over some of its own operations, such as labor negotiations. (This was recently granted.)

4. Reorganize and expand the public relations department.

Adoption of these proposals would accomplish several desirable objectives. Regular press releases would be furnished along with communications to the City Council. This would make it easier for the press to cover such communications factually and in the light of their true significance, which has not always been the case in the past.

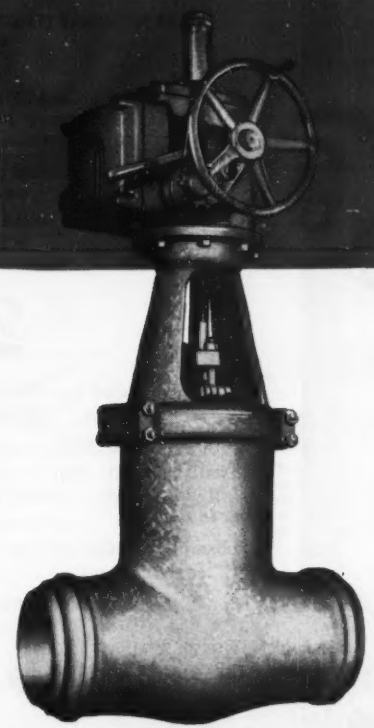
City Light news stories would be released through a centralized publicity office with an established reputation for accuracy, encouraging the confidence and cooperation of the press. Employee communications would be improved by having a trained, full-time editor on the employee publication, and by management-employee policy and information meetings.

One of the most important benefits would be having someone in attendance at management meetings whose primary responsibility would be anticipating the possible effect on public relations of all policy determinations of the Department. Even if the public relations aspects of a policy have

(*Continued on page* 168)

LIMITORQUE®

...the most widely used AUTOMATIC VALVE OPERATOR in the world



In all parts of the world, thousands of Limitorque Controls are in use for automatic or remote operation of valves of all types. Many of the leading Central Stations... huge Hydro-Electric Plants... Public Utilities of all kinds . . . Refineries and world famous Petroleum and Gas Pipe Lines are users of Limitorque Controls. Why! Because Limitorque Operators are designed to provide dependable, safe and sure valve actuation at all times.

Limitorque Controls function equally well, indoors or out . . . in any weather. A handwheel is provided for fast manual operation in case of power failure, and Limitorque can always be declutched for handwheel operation regardless of weather or electrical conditions. Any power source may be used for operation.

Our catalog L-50 illustrates and describes the Limitorque Valve operators. Write for a copy on your Business Letterhead.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

IN CANADA: WILLIAM AND J. G. GREEY LIMITED, TORONTO

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

PLP Dead-Ends+

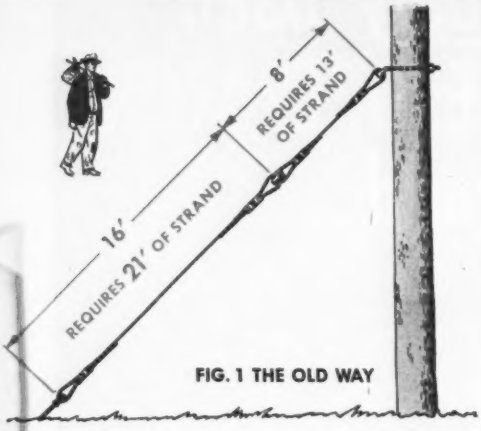
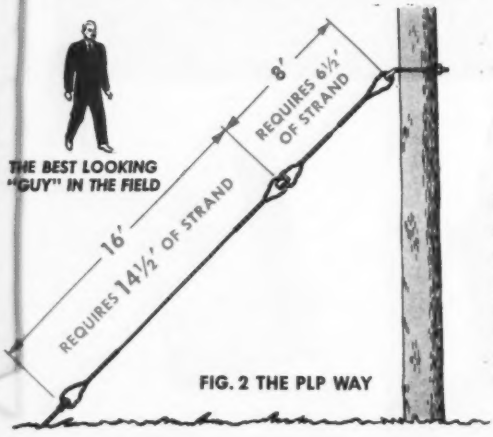


FIG. 1 THE OLD WAY



THE BEST LOOKING "GUY" IN THE FIELD

FIG. 2 THE PLP WAY

With PLP Dead-Ends, you save critical guy strand and get stronger, safer guys. For example, let's consider the 24-foot, 6000# guy (Fig. 1). Doing the job in this conventional way, using Siemens-Martin Strand, requires:

13′ of ⅜″ strand (TS 6950#)
weighing 273#/1000′ = 3.549 lbs.

21′ of ⅜″ strand (TS 6950#)
weighing 273#/1000′ = 5.733 lbs.

9.282 lbs.

But the equivalent PLP Dead-End installation (Fig. 2) using 3-wire Extra High Strength strand, requires only:

6½′ of ¼″ EHS strand (TS 6600#)
weighing 116.7#/1000′ = 0.759 lbs.

14½′ of ¼″ EHS strand (TS 6600#)
weighing 116.7#/1000′ = 1.692 lbs.

2.451 lbs.

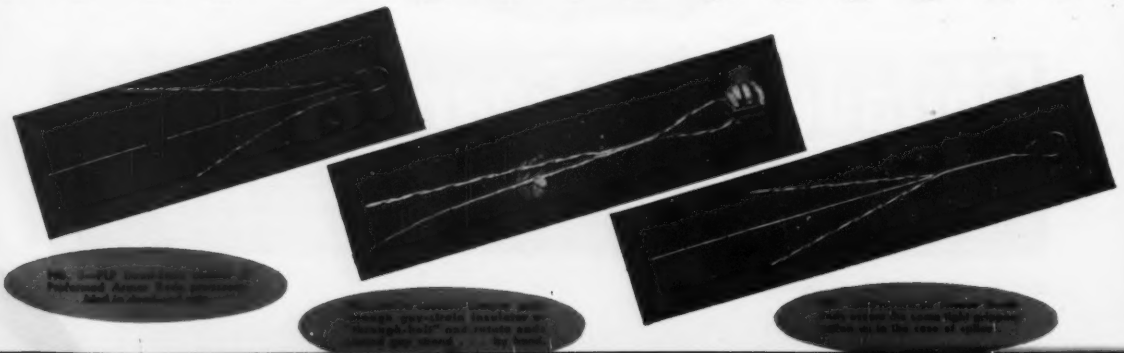
SAVING --- 6.831 lbs.

Making this Guy the PLP way results in a saving of 73% of critical guy strand . . . and you eliminate the need of any clamps.

With PLP Dead-Ends, even wrenches are not needed. Simply install by hand! (Fig. 4) Any lineman . . . regardless of his skill . . . can do a perfect job every time. *Installation time is cut in half.*

Substantial dollar savings are the result even with "B" and "C" coated strand.

And PLP Dead-Ends are stronger than the strand. See opposite page.



= 73% Saving of Guy Strand

STRAND STRENGTH EXCEEDED by PLP DEAD-ENDS

Recently, one of the best known electrical laboratories tested the static strength and the d-c resistance of various splices and dead-ends. The engineers found one system far better than the rest. So much better that you will want to see their testing procedure and test results.

HERE'S WHAT THEY DID

7-STRAND CONDUCTOR

FIG. 6

They took two sections of ⅜", 7-strand extra high-strength galvanized steel (catalog strength: 11,200 lbs.)

SPLICE

FIG. 7

Spliced them together, *by hand,* with *Preformed Armor Rods.*

DEAD END

FIG. 8

Then attached dead-ends of *Preformed Armor Rods* to both ends . . . using no tools, clips or clamps.

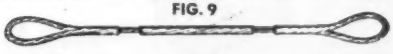


FIG. 9

DEAD END SPLICE DEAD END

Placed the specimen in a tensile testing machine. Measured the d-c resistance (through both dead-ends and the splice) under no load and under loads up to 5000 lbs. Continued loading until the specimen failed. Compared these results with an unbroken conductor of equal length.

HERE'S WHAT THEY FOUND

Preformed armor splices and dead-ends averaged at least 40% more conductivity than the unbroken cable every time the test was made.

Preformed armor splices and dead-ends proved stronger than the unbroken conductor. Breaks always occured in the section not protected by the *Preformed Armor Rods* . . . at about 10% more than the rated strand strength of 11,200 lbs.

* The use of Preformed Armor Rods for making better guys, is just one of the many applications of these revolutionary new rods. Utilities throughout the country are finding that they are invaluable for support armor, repair armor, splices, jumpers, ground strand armor, tie wire, dual-conductor spacers, lashing armor, dampers and suspension clamp jumpers. For complete information regarding any or all of these applications, just write to: PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland 3, Ohio.

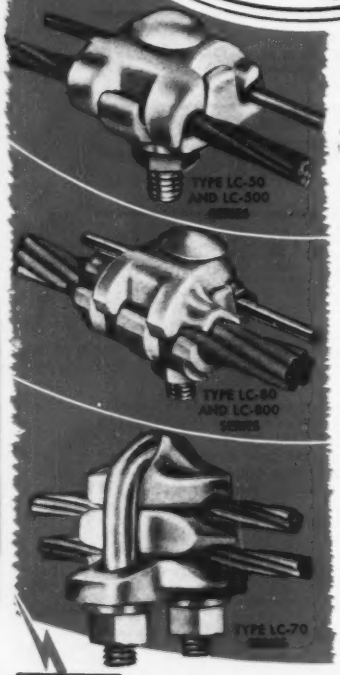
PREFORMED

LINE PRODUCTS CO.

CLEVELAND 3, OHIO

STOP
CONNECTOR
CORROSION
FAILURES
WITH

TYPE LC
CAST ALUMINUM
CONNECTORS
FOR
Aluminum Distribution Systems



Designed for connecting A.C.S.R. to A.C.S.R. or A.C.S.R. to copper, amerductor and copperweld conductors.

Failures of plated copper or copper alloy connectors installed on A.C.S.R. result from high resistance destructive corrosion of contact surfaces which occurs when copper bleeds through plating causing an electrolytic action with aluminum conductor strands.

Insure against corrosion—specify Type LC—connectors with clamping members of heat treated cast aluminum alloy No. 195—conductor grooves for copper, amerductor and copperweld conductors incorporate heavy copper liners bonded to connector body by a proven special process.

Backed by many years of coordinated electrical, mechanical and metallurgical engineering knowledge and experience in the design and manufacture of cast aluminum electrical products.

Consult one of our nearest 18 representatives or contact our main office.

Write today for Catalog Sheets U-3, U-5 and U-6.

OUR PRODUCTS ARE QUALITY CONTROLLED
FROM INGOT TO FINISHED PRODUCT

ANDERSON BRASS WORKS, INC.
POST OFFICE DRAWER 2151
BIRMINGHAM, 1, ALABAMA

AND BUS SUPPORTS
ALUMINUM SUSPENSION AND STRAIN CLAMPS

Public Relations

(*Continued from page* 164)

no direct effect on determination of the policy itself, this will make it much easier to publicize the policy in its most favorable light.

To carry the study one step further, the class made recommendations for programs covering employee, customer, and community relations. Aside from consideration of some unique local problems stemming from the take-over of property of the competing private utility, the programs represent a valid and valuable basis for either a municipal or privately operated utility to establish sound public relations.

To maintain good employee relations, four basic needs of the employee must be recognized and satisfied: Economic security, physical security, satisfaction or recognition, and representation. The first two of these are well-understood and provided for by civil service regulations, health and safety programs, and promotion of vocational training. One additional means of recognition suggested is the use of ads stressing the importance of the employee to the organization and community.

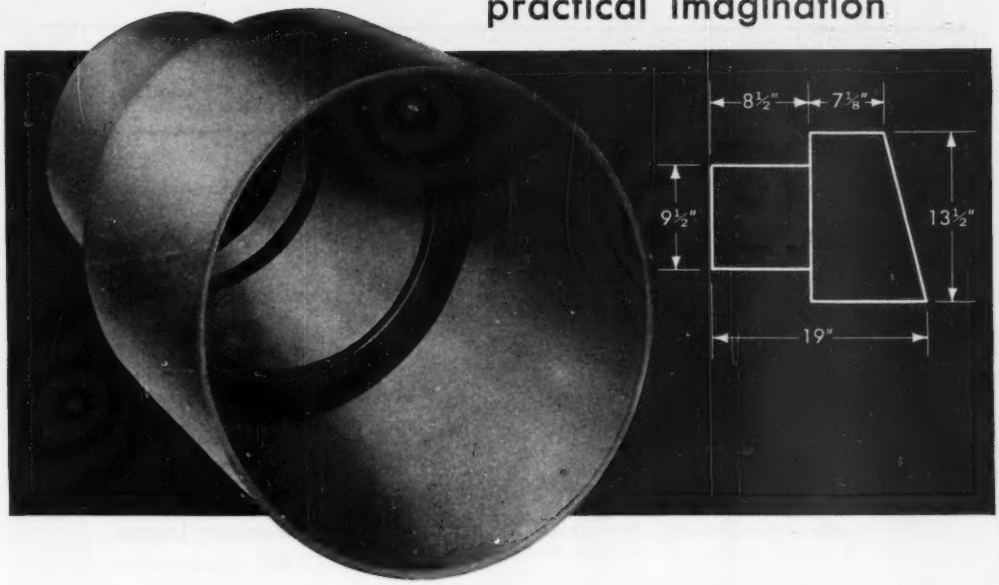
To insure adequate representation, a management-employee committee was suggested. Employees would select their representatives who would meet with management representatives once a month to discuss employee problems and policies.

Stress Employee-Customer Relations

Recognizing that employee-customer contacts are the most important means of establishing good customer relations, the study recommends an intensified public relations training program for all personnel contacting the customer. Another unusual recommendation was for the use of several types of advertising, including a cartoon series presenting some do's and don'ts of electricity.

Because of its new position as a monopoly in a community where competition long existed, City Light has a definite challenge to meet in winning and holding the confidence of the community. Again the individual employee is called on to carry much of the effort in his contact with the public. More than that, however, the study recommends use of community contact points to inform the public of all the Department's operations.

practical imagination



"welded" assembly makes large plastic parts practical and economical

Look at this large, laminated plastic part. It is 19" long with two concentric diameters of 13½" and 9½" connected by a flat ring. Think of the cost of molds for making such a piece—and then consider the fact that only a few such parts are required. The cost would be prohibitive.

It is on problems like this that Continental-Diamond's knowledge of plastics and their fabrication pays off for you. C-D engineers took two Dilecto tubes of the required diameters and wall thicknesses and then cut a ring from a sheet of Dilecto to just fit the O.D. of the smaller tube and the I.D. of the larger.

These three parts were then literally "welded" together into a strong, low cost part. The material used to do the "welding" is one of the compounds developed by C-D in their vast experience of fabricating parts of Fibre, Vulcoid, Celoron, Micabond, Dilecto and combinations of all of them.

If you have a problem—or a standard application for plastics, it will pay you to check with your nearest C-D office.

your partner in producing better products

DILECTO (Laminated Thermosetting Plastic)
CELORON (Molded High-Strength Plastic)
DIAMOND FIBRE (Vulcanized Fibre)
VULCOID (Resin Impregnated Fibre)
MICABOND (Bonded Mica Splittings)

DE-5-51

BRANCH OFFICES: NEW YORK 17 • CLEVELAND 14 • CHICAGO 11 • SPARTANBURG, S. C. • SALES OFFICES IN PRINCIPAL CITIES
WEST COAST REPRESENTATIVE: MARWOOD LTD., SAN FRANCISCO 3 • IN CANADA: DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO 6

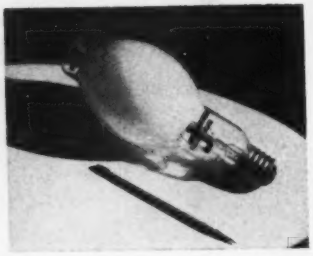
Continental Diamond FIBRE COMPANY

Established 1895 . . . Manufacturers of Laminated Plastics since 1911 — NEWARK 15, DELAWARE

NEW EQUIPMENT

Fluorescent Mercury-Vapor Lamp

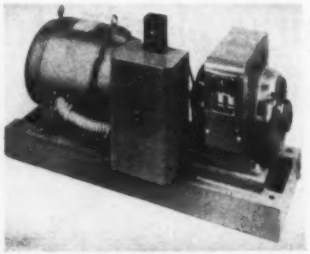
Designed to provide a whiter light from a mercury-vapor source, the bulb of the J-H1 has an inside coat of a phosphor that fluoresces red when activated by invisible ultraviolet light generated by the quartz arc. This tends to balance the spectrum and provide a light that is white enough for industrial purposes.



Lamp will burn in any position and can be used in existing fixtures for 400-watt mercury lamps. Rated average life is 4000 hours, rated initial lumens 18,000.

When used outdoors, fixtures should be enclosed to prevent cracking of glass by driving rain or moisture-laden insects.

Westinghouse Electric Corp, Lamp Division, Bloomfield, N. J.



High Cycle MG Set

New mono-coil high frequency motor generator set converts 60 cycle current to 180 and 360 cycles for high-cycle automatic electric hand tools.

Sets are self-exciting and have built-in voltage regulation which automatically compensates for fluctuations in voltage to the load.

Electric Machinery Mfg Co, Minneapolis, Minn.

•

Carrier Automatic Simplex Clickless Switching System

All switching of a newly developed automatic simplex switching scheme is accomplished electronically in response to speech itself. A fraction of a second's hesitation allows for line clearance and either party may begin to talk. Once speech is started, the line is open only the one way until the moment speech again stops.

This development allows party-line communications between several points and does not require press-to-talk switches and circuits which in turn permits automatic simplex operated circuits to be incorporated into standard telephone systems.

Operation is on a single frequency eliminating the complexities of full duplex type operation.

Motorola, 4545 West Augusta Blvd, Chicago 51, Ill.

•

Air Pollution Detector

Fully automatic analysis and recording of air pollution by SO_2 is possible with either the integrating or non-integrating Thomas Autometer.

The Integrating Autometer continuously records actual concentration of SO_2 in parts per million, records average concentration integrated over a half hour period, automatically checks its "zero reading" every half hour, and marks off each cubic foot of air sampled.

The Non-integrating assembly provides only the continuous record of SO_2 concentration.

Range of equipment is 0 to 5 parts SO_2 per million. Changes in concentration as small as a few tenths of a part per million can be detected.

Leeds & Northrup Co, 4934 Stenton Ave, Philadelphia 44, Pa.

Four-Channel Carrier

Four quality voice channels and four dial or ringdown signalling channels may be superimposed on an open wire line with the 32 E system.

Carrier frequency range is from 3.3 to 35 kc. Equipment coordinates with Type C Western Electric systems and provides the additional advantages of a fourth channel and dialing operation.

Lenkurt Electric Co, County Road, San Carlos, Calif.

•

Pneumatic Lopper

Air powered insulated line clearing tools have been developed for utilities and telephone companies for right-of-way maintenance.

Standard lopper is 6-ft 8-in. in length, weighs 9 lb 8 oz and has cutting capacity of 1¼ to 1¾ inches. A heavy duty model cuts limbs up to 2½ inches in diameter.

All units can be operated from any self contained power source or power-take off compressor with capacities of 17-30 cfm and 125-150 psi.

Miller-Robinson Co, 7007 Avalon Blvd, Los Angeles 3, Calif.

•

Circuit Reclosing Relay

Combined with various sensing devices the HHR circuit reclosing relay can test for continuity of normal or abnormal conditions of voltage, frequency, current, pressures, speed weight, light, etc.

In operation the relay automatically

out of sight, out of mind

Hubbard-Copperweld Ground Rods LAST... and LAST... and LAST...

Clamps may be had with safety set screw as shown, or with square bolt head.

Cross section of a ½-inch Copperweld Ground Rod showing approximate proportion of copper and steel.

Installed underground, out of sight, for years and years to come. Out of mind, too; no more worries about protection. Periodic tests can be made quickly, easily.

Hubbard-Copperweld Ground Rods combine the strength of alloy steel with the permanent corrosion resistance of copper. The permanent Molten-Weld completely eliminates the possibility of harmful electro-galvanic action within the rod. There are no microscopic cracks, fissures, or pin holes in the thick copper exterior. They offer assured protection when installed to a sufficient depth to reach permanent moisture.

The time-tested dependability and economy of Hubbard-Copperweld Ground Rods have been proved in service for 35 years. They offer permanent grounding protection at lowest annual cost. They come in diameters from ⅜ to 1-inch and in lengths from 5 to 40 feet.

HUBBARD AND COMPANY

ESTABLISHED 1843

PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA

"Hang the load on Hubbard Hardware!"

"are you taking full advantage of Penta's* superiority?"

PENTA **is a clean wood preservative.**

PENTA **is a chemical with lasting, uniform effectiveness.**

PENTA **treatment costs no more.**

*PENTA *is a common abbreviation of the name of the chemical, PENTAchlorophenol.*

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

Write *for Dow's free booklet "Pointers on Penta."*

The Dow Chemical Company
Dept. PE-9A
Midland, Michigan

Name _____ **Title** _____

Company _____

Address _____

City _____ **State** _____

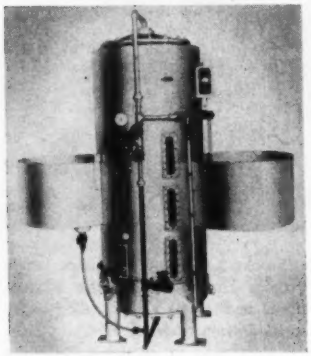
DOW
Penta
chlorophenol

tests for the continuity of a fault for a given number of times at specific intervals. Should the fault be cleared during any one of the tests the control is restored to its normally operating condition. Should the fault persist, the protective device automatically locks out the control circuit until the fault has been cleared manually.
R. W. Cramer Co, Centerbrook, Conn.

•

Demineralizer

Cation and exceptionally strong base anion exchangers are intimately mixed in a single unit tank, providing in one container the equivalent of a large number of multiple bed systems.



Raw water passed through the Mono-Bed column only once has a mineral content of virtually zero. Resistances as high as twenty megohms per cm have been reported.

Models are available in flow rates ranging to 5,000 gph and up.
Penfield Mfg Co, 19 High School Ave, Meriden, Conn.

•

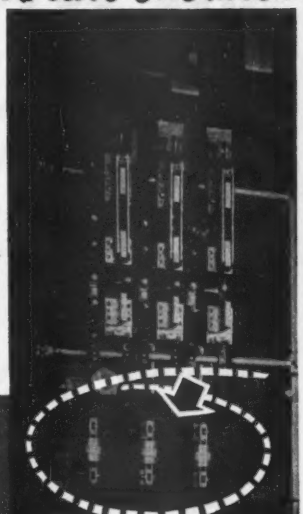
Class H Insulation

A new asbestos-base, silicone-treated, high temperature insulation has been developed by Johns-Manville for service at 180 C. It is a class H insulation as defined by AIEE standards.

Quinterra Type 3 maintains a dielectric strength of at least 350 VPM under continuous exposure to Class H maximum temperature of 180 C. Dielectric strength reportedly remains practically constant even under high humidity conditions.

Extreme flexibility and resistance

how to trap amperes and save circuits....



SHAWMUT Amp-trap®

The three Amp-Traps shown raised the interrupting capacity of this 1600 amp circuit to 100,000 rms amperes @ 440 volts.

AMAZING NEW CURRENT LIMITER

100,000 rms AMPERES INTERRUPTING CAPACITY

TWO-WAY PROTECTION

Amp-trap protects against *both* overloads and shorts on circuits up to 600V AC or DC. It is supplied in all standard ratings from 1 to 4,000 amps, and limits short circuit current on circuits where the available short circuit current may be as high as 200,000 amps.

STOPS SHORT CIRCUITS SHORT

Amp-trap puts a dependable new protective device in the hands of designers, engineers and architects. Lightning fast, it is directly responsive to the *rate of short circuit current rise.* In fact, *it is as fast as the circuit is fast.* This means positive overload and short circuit protection for switchgear, busducts, motor starters, circuit breakers, and current transformers. What's more, with Amp-trap, you can now have low-cost protection for every service entrance on a network system.

APPROVALS

Amp-trap is listed by Underwriters Laboratories. Interrupting tests up to 202,000 amps at 500 Volts 60 cycles have been witnessed and certified by Electrical Testing Laboratories, Inc.

FOR OLD OR NEW SYSTEMS

There is an Amp-trap for every application. They are easily installed and quickly adapted to new or old equipment. Cost is so low that it is not an important factor.

WRITE TODAY. SEND FOR FREE BOOKLET ON AMP-TRAP.

*Trade Mark Registered.

(You can get Amp-trap)

THE CHASE-SHAWMUT CO.

370 MERRIMAC STREET • NEWBURYPORT, MASSACHUSETTS

MEMO:

To Manufacturers of Electrical Equipment requiring Bushings or Special Porcelain

Pinco for many years, has been expanding its special porcelain facilities to meet the ever increasing demand for custom-made porcelain by electrical equipment manufacturers. The fact that many applications of porcelain insulation are of a special nature thereby requiring specially designed and fabricated porcelain, accounts for the tremendous growth of this particular phase of our business.

In addition to custom-made porcelain, Pinco also produces a standard line of dry type Transformer Bushings, such as the L2657 shown here. These Bushings are equipped with standard terminals and are furnished completely assembled with the necessary hardware ready for mounting on transformers or other applicable equipment. Made by the famous Pinco wet plastic porcelain process, these Bushings embody all of the superior electrical and mechanical qualities which characterize Pinco transmission and distribution insulators.

PINCO L 2567
Dry Type Bushing

SPECIFICATIONS
Voltage Rating 8.6
Ampere Rating ..... 400 Amp.
Max. Cable Size ... 400,000 C.M.

Quotations on Pinco special porcelain are made from customer blue print or sketch. If you wish, our engineering department will assist you in designing the porcelain you require. *Refer to Pinco Catalog No. 49 for complete specifications on standard bushings.*

The Porcelain Insulator Corporation
781 Main St., Lima, N. Y.
Sales Agents: JOSLYN MFG. & SUPPLY CO.
Offices in Principal Cities

PINCO INSULATORS

Suspension Insulators . . . Switch and Bus Insulators . . . Distribution Clamps . . . Distribution Pin Types and Guy Strains . . . Transmission Line Fittings . . . Tree Insulators . . . Transformer and Circuit Breaker Bushings . . . One Piece and Multi-part High Voltage Pin Types . . . Suspension and Strain Clamps . . . Indoor Bus Support Porcelain . . . Lightning Arrester Porcelain.

to cracking or crazing are reported.

Sheets, rolls and tapes 3 to 9 mils in thickness can be factory cut to specification.

Johns-Manville, 22 East 40th St, New York 16, N. Y.

•

Industrial Lamp

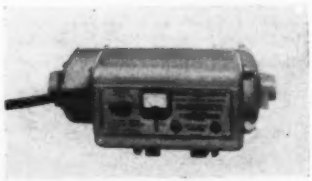
Average life of this new 800-watt incandescent lamp is 1,500 hours providing a saving in replacement dollars and manpower over the regular 750-watt bulb with its 1,000 hour average.

Smoke and fume particles which drop a curtain around the conventional pear shape do not cling easily to its downward face.

Silvery reflector on the inside of the bulb eliminates the need for a separate reflector.

Westinghouse Electric Corp, Lamp Division, Bloomfield, N. J.

•

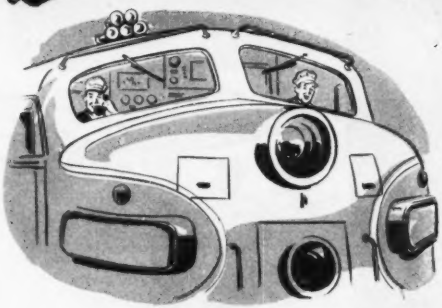


MG Battery Charge

Designed to permit mounting on balconies or shelves to save vital floor space a new unit accomodates 6-19 lead acid and 10-30 nickel-iron-alkaline cells.

Fully automatic, the unit incorporates automatic control of charging rate under the modified constant voltage charging system and automatic

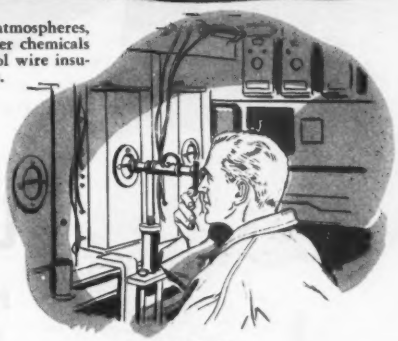
(*Continued on page* 178)



Heat and Cold Resistance. Railroad communications and signaling wires and cables insulated with VINYLITE Brand Plastics withstand heat, cold, rain, oils, greases, industrial atmospheres.

Moisture Resistance. In wet locations afloat or ashore, VINYLITE Brand Plastic insulation resists water, humidity, mildew, fungi, weathering, aging, heat, cold, flame.

Chemical Resistance. Corrosive atmospheres, alkalies, most strong acids and other chemicals fail to injure machinery and control wire insulated with VINYLITE Brand Plastics.



to be sure wire lasts be sure it's insulated with . . .

Vinylite BRAND RESINS

TRADE MARK

BAKELITE COMPANY

A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street, New York 17, N.Y.

For railroad communications and signaling, for chemical plants, refineries, electronic apparatus—wherever wires and cables come in contact with fresh or salt water, corrosive atmospheres, chemicals, humidity, heat, cold, wind or storm, insulation of VINYLITE Brand Plastics outlasts ordinary insulating materials.

Smaller than conventional diameters save space. Smooth surfaces speed installation in conduits. They strip and splice easily. Lasting colors provide permanent coding.

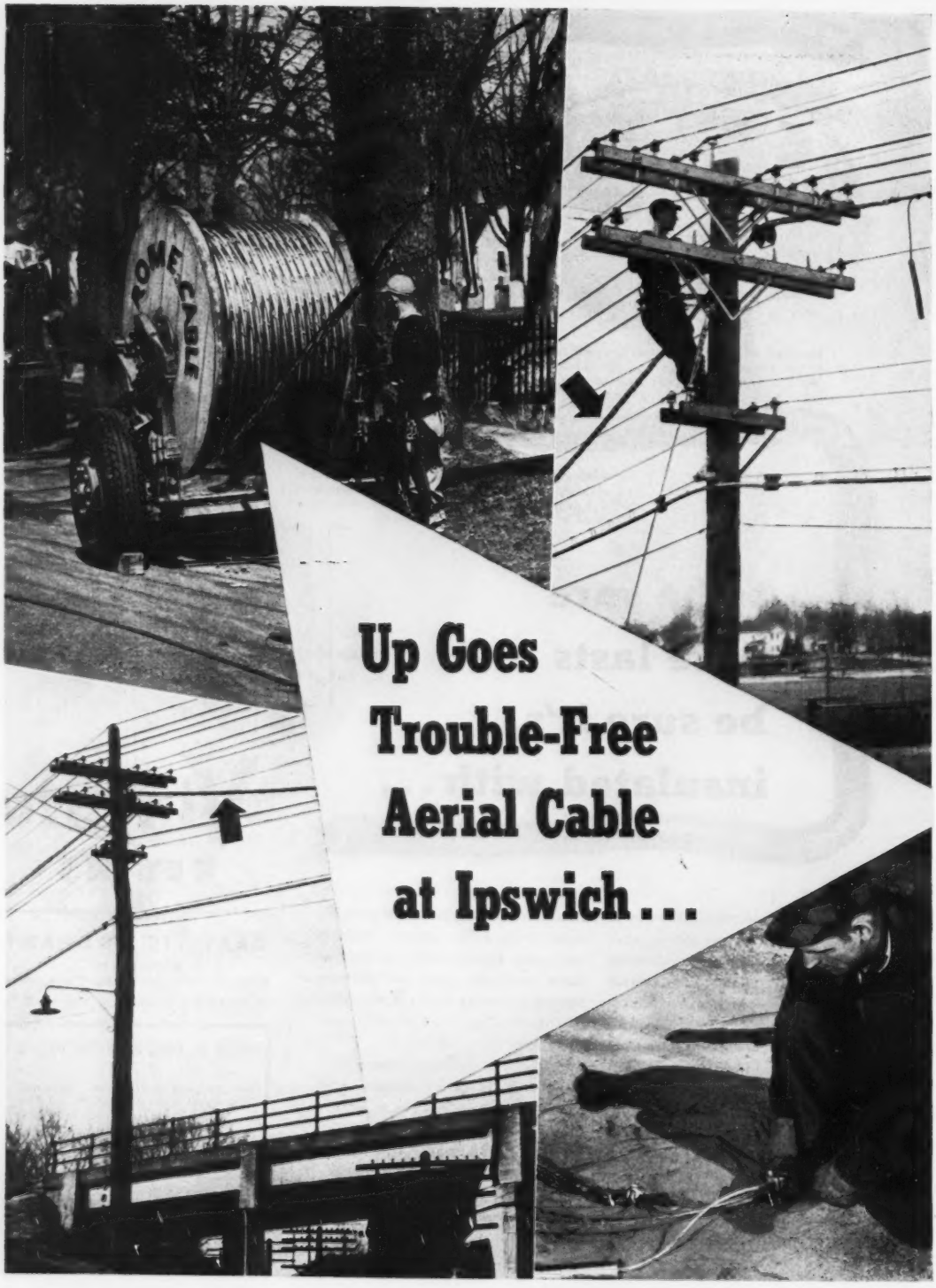
Maintenance costs approach the vanishing point because VINYLITE Plastic insulating materials strongly resist water, oils, greases, alkalies and most strong acids, as well as flame, sunlight, aging and mildew. Special jacketing stocks remain flexible at –60 deg. F. while others stay on the job up to 200 deg. F.

They have withstood more than seven years of direct immersion in water, and twelve years in the ground, without a trace of failure.

For the very best in wire and cable insulation and jacketing, specify VINYLITE Brand Plastics. Write for a list of representative manufacturers supplying them. Dept. LC-28

MEMO TO WIRE MANUFACTURERS

There's news of importance about VINYLITE Plastic Electrical Insulating Compound QG 5909 in *Kabelitems* No. 52 available from Bakelite Company for the asking. This useful material has been recently listed by Underwriters Laboratories as a 60 deg. C. oil-resistant appliance wiring. The report covers in detail the laboratory tests—and may well indicate how you can promote efficiency and cut costs in your operation. Get your copy now.



Up Goes Trouble-Free Aerial Cable at Ipswich...

Typical RoZone Applications:

Multi-Conductor RoZone-RoPrene Power Cable—3000 Volts

Single Conductor RoZone-RoPrene Power Cable, Ungrounded Neutral—8000 Volts

RoZone-RoPrene Station Control Cable—600 Volts

RoZone-RoPrene Series Street Lighting Cable—2001 Volts and up

Rome RoZone®

Accepted by leading industrials and utilities. Approved by Civil Aeronautics Administration under Specification L-824 for airport lighting and control circuits.

The Town of Ipswich, Massachusetts recently extended its primary distribution facilities.

By selecting a specially designed three conductor pre-assembled aerial cable insulated with Rome RoZone for this job, Ipswich has assured itself of years of trouble-free service. For, no insulation has a better record. Its high dielectric and impulse strength, combined with superior resistance to corona and ozone cutting are properties which make RoZone a *premium insulation.*

Equally important, RoZone is unusually resistant to water. Its electrical properties remain unaffected by long-time burial in earth or exposure to atmosphere. It has remarkable stability for any installation where long-time dependability is paramount.

And, RoZone maintains these desirable features for years and years. Its inherent resistance to aging, heat, ozone and moisture makes it the *first choice* for aerial or underground services, 600 volts and higher. RoZone insulation is highly recommended for power cables, supervisory control and signal cables, street lighting cables, as well as general purpose wiring. *You will save by specifying Rome RoZone.* For further information use coupon below.

Copper wire mill products are a Controlled Material under N.P.A. Controlled Materials Plan. USE YOUR CMP ALLOTMENT.

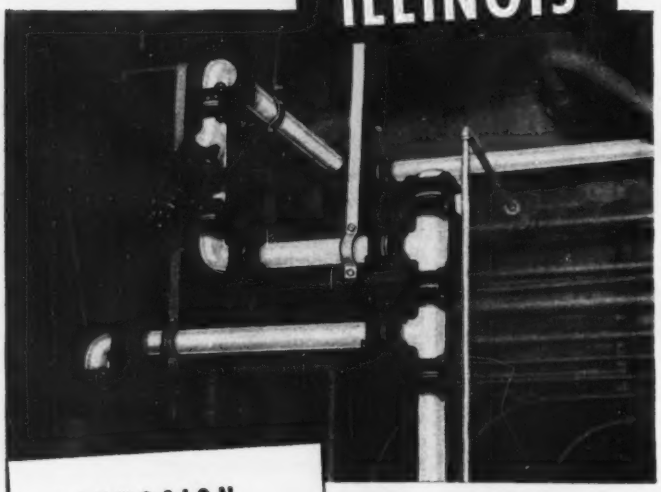
It Costs Less To Buy the Best

ROME CABLE Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

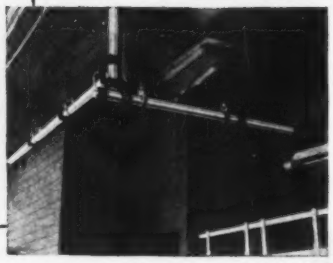
ROME CABLE CORPORATION, Dept. EW-9, Rome, N. Y.
Please send copy of new Rome Power and Control Cable Catalog.

Name .....
Company .....
Address .....
City ..... Zone ..... State .....

POWER COMPANY INSTALLS ILLINOIS



CORROSION RESISTANT PORCELAIN PIPE, VALVES AND FITTINGS!



CENTRAL Illinois Public Service Company uses Illinois chemical porcelain pipe, valves and fittings in its Meredosia Power Station at the discharge of alum treating tank. Other Illinois installations at this station include the vent and drain piping from the battery room, and laboratory drain.

Illinois chemical porcelain's non-absorbent supersmooth inside surfaces prevent wear and abrasion and combined with its strong, fracture-resistant walls make it the ideal material for *permanent* fluids handling systems.

Keep your systems in constant operation — reduce production losses caused by frequent replacements of pipe, valves and fittings—specify and use Illinois acid and alkali-resistant porcelain.

Write for Free Copy of Catalog C-3!

CHEMICAL ILLINOIS ELECTRIC PORCELAIN CO. MACOMB, ILLINOIS

New Equipment

(*Continued from page* 174)

cut-off of battery and shut down when fully charged.

Voltage (based on the number of cells) and current (based on ampere-hour battery ratings) are adjustable.
General Electric Co, Schenectady

•

Soldering Pliers

Parts to be soldered may be held and heated in one operation with this tool. A foot switch controls operation.

Average power consumption on a 25% duty cycle is 75 watts.
St. John Engineering Co, 4131 Lankershim Blvd, North Hollywood, Calif.

MORE NEW PRODUCTS

Just Received

Appearing Next Issue

Snow Depth Reporter

Radio-active isotopes buried in isolated areas indicate snow depth. FM 2-way radios automatically transmit data to central recording stations.

Improved Diesel Engine

Lowering the temperature of air in cylinder at the time fuel is injected increases amount of fuel that can be burned—increases horsepower output without increasing peak temperatures or pressures.

Multiple Power Supply

All of the low voltages required in experimental laboratory are supplied by the model 610 power supply.

Regulated dc voltages range from 0 to 550 at 5 to 325 ma (depending on voltage range). In addition, a filament supply, a negative 150 volt bias supply and a nominal 28 volt dc supply suitable for relay, small motor or similar applications are included.

Features include separate power switches for each channel, voltmeter

(*Continued on page* 182)

Save copper with
CHASE BUS CONDUCTORS

You can cut your copper requirements for bus conductors up to 36% by using Chase ventilated square copper tube bus conductors, instead of rectangular flat bars.

Chase square copper tube buses can withstand heavy short circuit stresses because of their high mechanical strength. The large cross-sectional areas permit longer spans between supports without unduly large sags.

They have high thermal conductivity and low resistance voltage drop and power loss per pound of metal. Send for the Chase Copper Bus Conductor Handbook giving specifications and installation data.

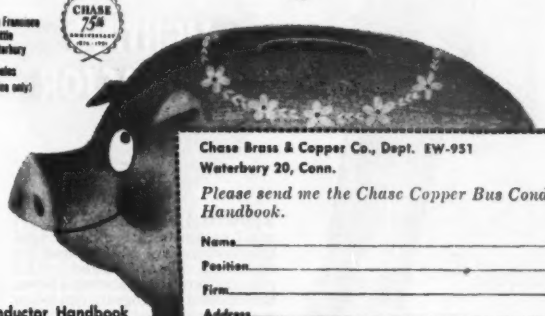
Chase BRASS & COPPER

WATERBURY 20, CONNECTICUT • SUBSIDIARY OF KENNECOTT COPPER CORPORATION

• *The Nation's Headquarters for Brass & Copper*

Albany†	Cleveland	Kansas City, Mo.	New York	San Francisco
Atlanta	Dallas	Los Angeles	Philadelphia	Seattle
Baltimore	Denver†	Milwaukee	Pittsburgh	Waterbury
Boston	Detroit	Minneapolis	Providence	(†sales office only)
Chicago	Houston†	Newark	Rochester†	
Cincinnati	Indianapolis	New Orleans	St. Louis	

CHASE 75th ANNIVERSARY 1876 1951



FREE Chase Bus Conductor Handbook gives physical and electrical characteristics as well as data on copper saving.

Chase Brass & Copper Co., Dept. EW-951
Waterbury 20, Conn.

Please send me the Chase Copper Bus Conductor Handbook.

Name_____

Position_____

Firm_____

Address_____

City_____ State_____

Straight to the HEART OF YOUR

Prospects by the million will see and hear SYLVANIA!

Full-color ads in leading national magazines . . . plus big TV show and popular premium offer assure Record Sylvania Lighting Sales

It's hard to keep from bustin' out with a lot of superlatives about Sylvania's 1951 fall campaign!

Actually, it's the greatest and most complete advertising program in the history of Sylvania. It is planned and launched to bring record returns to every lighting retailer, wholesaler, and contractor who cooperates.

Look at the group of national publications scheduled to tell Sylvania's quality lighting story . . . both fluorescent and incandescent! They'll reach the majority of electrically wired homes in the entire country. Then, there's the great TV show "Beat the Clock" that sells Sylvania to millions of prospects *every week.*

Finally, there's a premium that's a world beater. It's an all-aluminum Handy-Tongs that every housewife needs in her kitchen.

HANDY-TONGS PREMIUM . . .

a Bang-up Sales Builder

25¢

with the outside of a Sylvania 4-Pack

Free Display Material. Large, full-color window and counter display cards and streamers tie in with the national ads and tell prospects about the Handy-Tongs offer.

QUALIFIED
LIGHTING CONTRACTOR
AUTHORIZED SYLVANIA SALES SERVICE

3 powerful, personalized direct mail campaigns for Electrical Contractors are also offered by Sylvania. Spear-headed by the colorful emb em, shown above, this special ad program can mean more business for Electrical Contractors everywhere. Write Sylvania for full details NOW!

MARKET

GOES SYLVANIA'S BIGGEST AND MOST BRILLIANT LIGHTING CAMPAIGN

Full-color ads in the Saturday Evening Post, American Weekly, and This Week will drive home the facts about the high quality and leadership of all Sylvania products.

Concurrently with this campaign, full pages in Time Magazine, Newsweek and Business Week will emphasize . . . again and again . . . the reasons why Sylvania Fluorescent Tubes last longer . . . stay brighter.

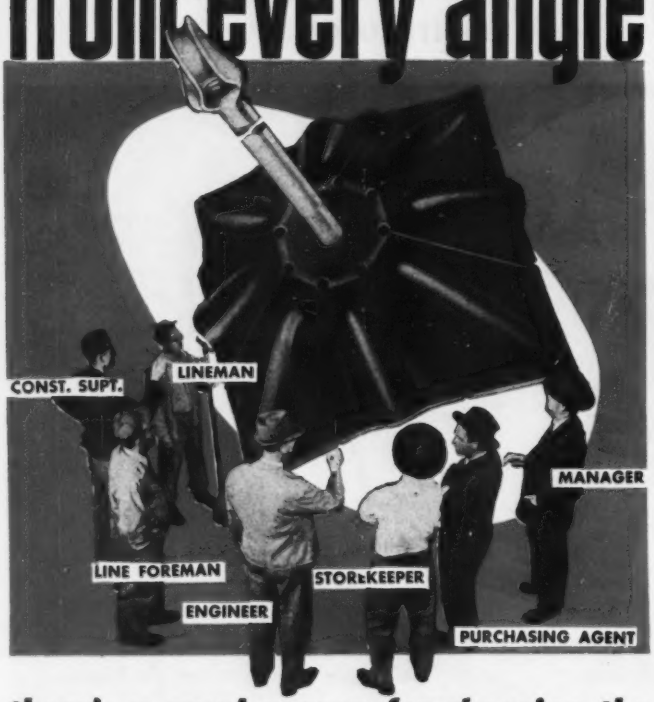
Meantime, the big TV show "Beat the Clock" headed by Bud Collyer, plus the radio shows of Grantland Rice and Sammy Kaye will continue to build up the name and fame of Sylvania. For full information about any phase of this great program, or how it can be made to serve you best, write today to: *Sylvania Electric Products Inc., Dept. L-7109, 1740 Broadway, New York 19, N. Y.*

SYLVANIA

SYLVANIA ELECTRIC PRODUCTS INC. 1901–1951 FIVE DECADES OF PROGRESS 50th ANNIVERSARY

FLUORESCENT TUBES, FIXTURES, SIGN TUBING, WIRING DEVICES; LIGHT BULBS; RADIO TUBES; TELEVISION PICTURE TUBES; ELECTRONIC PRODUCTS; ELECTRONIC TEST EQUIPMENT; PHOTOLAMPS; TELEVISION SETS

from every angle



there's a good reason for choosing the

CHANCE STEEL 8-way Expanding Anchor

Here's what the men who buy and use them say: **Linemen**—"We don't have so much weight to carry."—"It takes fewer licks to expand."... **Foremen and Construction Superintendents**—"We do save some time and labor."—"There's no danger of breakage."—"We can tell when this anchor is expanded."... **Storekeepers**—"They're easy to handle."—"Your colored identification tag is a big help."... **Engineers**—"We can depend on the uniformity of steel."—"You've taken full advantage of all the area."—"Our tests show it has surprising strength."—"The cone shape is a good idea—you get a wedging action."... **Purchasing Agents**—"Any time we can satisfy ourselves on quality at a price we like—we're happy."... **Management**—"We've seen convincing proof that our lines are going to stay put with your 8-Way in the ground."... Whether you represent one or a combination of the men above—there's good reason for choosing the Chance 8-Way Expanding Anchor... You get more for your money.

© C50-53

ABC INDUSTRIES

No Load's It's Right when you specify CHANCE

A. B. CHANCE CO.

CENTRALIA, MISSOURI • SAN FRANCISCO, CALIFORNIA

New Equipment

(*Continued from page* 178)

and ammeter switching to monitor all regulated voltages, and a fused convenience outlet for operating external equipment.

Bristol Engineering Corp, Lincoln Ave & Pond St, Bristol, Pa.

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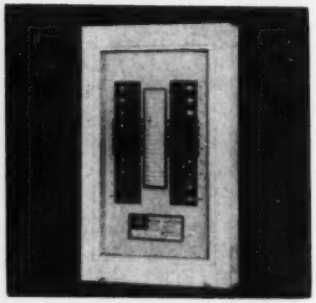


20 Circuit Load Center

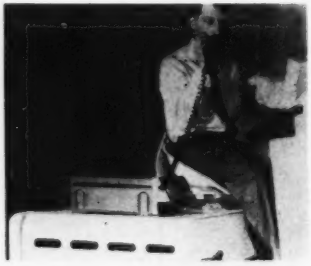
Fully magnetic action of the breakers in this load center differs from that of thermal devices in that operation does not vary with temperature.

Opposite polarity is provided in each adjacent position to give maximum flexibility of circuit connections.

Any combination of ten 2-pole circuits, 125-250 volts ac to twenty single pole circuits 125 volts ac is provided.

Murray Manufacturing Corp, 1250 Atlantic Ave, Brooklyn, N. Y.

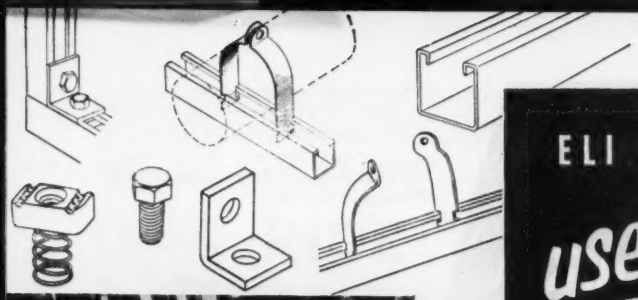
•



Low Power 2-Way Radio

A new low-power 2-way radio that utilizes the Uni-Channel Sensicon receiver has been designed by Motorola to meet the accelerating demand of industrial radio installations.

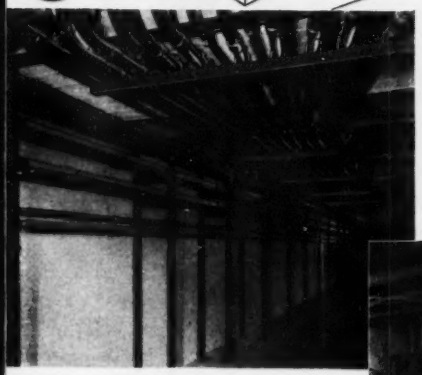
Receivers can be installed either as base stations or as mobile units and are available with built-in speaker and control head, or with individual



ELI LILLY AND COMPANY

use UNISTRUT®

METAL FRAMING



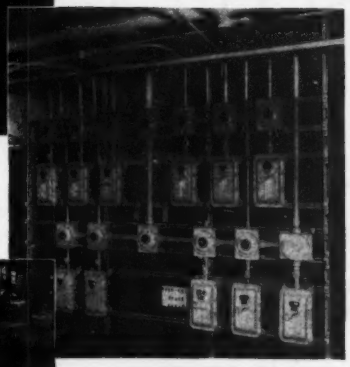
Stanchions and trapeze supports of UNISTRUT carry high voltage and metering conduits in a Lilly tunnel installation.

in countless plant maintenance jobs!

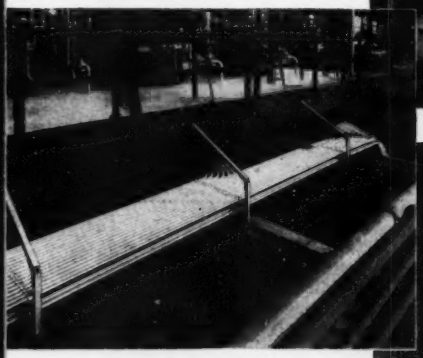
STOCKED IN ALL PLANTS AS STANDARD SERVICE STORES ITEM

Lilly uses UNISTRUT to

- ★ **Rack Conduit, Cable and Mechanical Piping**
- ★ **Frame Power Load Centers**
- ★ **Mount Switches, Meters and Panelboards**
- ★ **Support Fluorescent Fixtures**
- ★ **Construct Assembly Tables and Conveyor Supports**



Load Center in Glandular Products section. Note how flexible UNISTRUT permits gear to be installed in exact location desired.



Here UNISTRUT carries heavy banks of conduit leading to motors in the penicillin fermentation area.

First UNISTRUT installation made at Eli Lilly, in 1942, supports motor controls for pumping equipment.

LILLY maintenance men find completely adjustable UNISTRUT all-purpose metal framing easy to handle and quick to erect, providing great strength without bulk. Adjustments, changes, and additions are easily made at any time.

UNISTRUT cuts costs, too. You save time in engineering detailing and eliminate the need for trained erection crews—anyone can build with UNISTRUT. No drilling, no welding, no special tools or equipment—all you need is a hacksaw and a wrench. It will pay you to stock UNISTRUT as a maintenance material.

UNISTRUT®

The World's Most Flexible All-Purpose Metal Framing.

Representatives and Warehouse Stocks in Principal Cities. Consult your Telephone Directories.

U. S. Patent Numbers
2327587 2329815
2345650 2363382
2380379 2405631
2541908
Other Patents Pending

New FREE

78-page UNISTRUT Construction Catalog No. 700

Write for your copy today!

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd. Chicago 7, Ill., Dept. W-9

Please send the items checked below, without obligation:

☐ New Catalog No. 700 ☐ Wall Chart
☐ UNISTRUT Sample

Name_____

Company_____

Address_____

City_____ Zone____ State_____

100 KVA Type F Transformer
2400/120/240

450 KVA, Type F Unit Substation, 4160 V. Delta, 60 Cycles, 3 Ø— 120/208Y, 4 wire.

Made by a pioneer in the dry type, air-cooled transformer field. Eliminate need for liquid filled units. No hazardous, inflammable oil or toxic liquid to fuss with. Maintenance of oil level, foreign matter, sludge accumulation, and subsequent filtering are relegated to the "horse and buggy days".

MARCUS DRY TYPE, AIR-COOLED TRANSFORMERS

ARE SAFE — No explosion or fire hazards. No fire proof vaults. Class B and C heat proof insulations.

ARE ECONOMICAL — Lower cost installation and operation, negligible maintenance.

For the transformer that's second to none, specify MARCUS.

ONE OF THE WORLD'S LARGEST MANUFACTURERS OF DRY TYPE TRANSFORMERS EXCLUSIVELY

1 to 2,000 KVA up to 15,000 Volts to meet Individual Requirements

- DISTRIBUTION
- GENERAL PURPOSE
- UNIT SUBSTATION
- PHASE CHANGING
- ELECTRIC FURNACE
- RECTIFIER
- WELDING
- MOTOR STARTING
- SPECIAL

NEMA

Representatives in Principal Cities

MARCUS TRANSFORMERS CONFORM TO THE STANDARDS OF N.E.M.A. AND A.I.E.E.

MTC

MARCUS
TRANSFORMER CO.
INC.
30 MONTGOMERY STREET
HILLSIDE 5, NEW JERSEY

PIONEERS IN THE FIELD OF AIR COOLED TRANSFORMERS

speaker and control head.

Models are available for operation for either 6-volt dc, 12-volt dc, or 117-volt ac source.

Motorola 4545 West Augusta Blvd, Chicago 51, Ill.

•

Copying Machine

The new Copyflex Model 20 offers 46-inch printing width with exposure speeds up to 95 inches per minute.

This unit requires no installation. Copies may be made on sensitized paper, acetates, films and cloths.

Operator feeds sensitized medium and translucent original into the machine — copies are processed and stacked ready for use.

Charles Bruning Inc, 100 Reade St, New York City

•

Solenoid Contactors

Multi-pole unit construction, and double break silver contacts easily converted to normally open or closed contacts are important features of the new 4458 Size OA.C contactors.

Contacts are available in 3 and 5 pole forms. Contactors can be furnished with dc solenoid for 115 or 230 volt operation.

Maximum ratings are 2 hp, 440-550 volts, 3-phase 60 cycles.

Ward Leonard Electric Co, Mount Vernon, N. Y.

•

Electronic Potentiometer

A new instrument combining the advantages of pneumatic control and a full 120-foot-long, 11-inch calibrated width chart has been designed for application where the larger and longer

(*Continued on page* 188)

MORE AMPERES CAN RIDE THESE CABLES

You can do yourself and our country a service by installing Simplex-ANHYDREX XX Cables wherever you need to replace high voltage power cable.

Here's why. You can crowd more amps into the same size copper when it is insulated with Simplex-ANHYDREX XX. That's how you save copper. Of course your cables will run hotter but that's all right with Simplex-ANHYDREX XX insulation. This insulation is built to withstand 75°C. to 80°C. (167°F. to 176°F.), depending on operating conditions.

Simplex-ANHYDREX XX Insulated Cables can be used underground, directly in the earth, or in ducts, or they can be used overhead as aerial cables. The special Simplex neoprene jacket protects these insulated conductors from sunlight, oil, acids, alkalies, etc.

Want to know more about this versatile high temperature, high voltage power cable insulation that really combats moisture and water? Then return the coupon. No obligation, of course.

Simplex-ANHYDREX XX is a product of Simplex Research

SIMPLEX WIRES & CABLES

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
GENTLEMEN: PLEASE SEND A COPY OF BOOKLET 1009A TO:

NAME_____ TITLE_____
COMPANY_____
STREET_____
CITY_____ STATE_____

Westinghouse Switchboard Instruments are used as "standards" on this Universal Tube Test Station manufactured by Radio Corporation of America.

Westinghouse Switchboard Instruments are available in circular or conventional scale types for any switchboard application.

Where instrument accuracy is a "Must"...

specify Westinghouse

The use of Westinghouse instruments as "standards" on RCA's Master Tube Test Stations demonstrates how they measure up to *your* need for accurate measurement of any electrical quantity.

In order to reliably measure the quality of all types of electronic tubes the instruments have to consistently maintain precise accuracy. Westinghouse Switchboard Instruments not only fulfill this requirement but provide important plus benefits as well: Easier readability—to simplify the operator's job . . . and co-ordinated space-saving design—to contribute to the functional compactness of the unit.

Here's further assurance of quality: all Westinghouse switchboard panel, portable and recording instruments are built to meet the rigid performance requirements of the American Standards Association. Moreover, you can select from . . .

The most complete line in the industry!

You get a wider selection for every need whether it be a-c or d-c current and voltage, single or polyphase circuits, watts or vars, frequency, power factor, synchroscopes, temperature indicators, ground detectors or synchrotie (position indicators). And you get . . .

Competent application assistance!

Westinghouse Instrument Application Engineers are available to consult with and serve you in selecting and applying the proper instruments for your application. Simply call your nearest Westinghouse office.

For complete information about Westinghouse Instruments write for Booklet B-4696. Address: Westinghouse Electric Corporation, P.O. Box No. 868, Pittsburgh 30, Pennsylvania. J-40400

YOU CAN BE SURE... IF IT'S

Westinghouse

INSTRUMENTS

no worry and fear... no costly down time here

Management and workers alike know their plant is safeguarded from fire. No chance of a short circuit, a stray spark, a forgotten cigarette or spontaneous combustion starting a raging fire that could cut into vital production time, endanger the lives of employees or damage hard-to-get equipment, thanks to efficient, quick-acting C-O-TWO Fire Protection Equipment.

You too, can have this same secure feeling . . . this same positive protection from costly fires by installing complete, approved C-O-TWO Fire Protection Equipment. For example, the new C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing Systems keynote flexibility to meet your particular fire protection needs. Flammable liquids, electrical equipment, storage and manufacturing processes can all be made firesafe from a single low pressure carbon dioxide storage tank . . . capacities range from one to fifty tons of fire-killing carbon dioxide. If fire should strike . . . fast, clean, non-damaging, non-conducting carbon dioxide extinguishes the blaze in seconds . . . no water damage, no after fire mess.

Further, when a C-O-TWO Smoke or Heat Fire Detecting System is used in combination with a C-O-TWO Low Pressure Carbon Dioxide Type Fire Extinguishing System, the first trace of smoke or spark of fire in a protected area immediately sounds an alarm . . . then the fire quenching carbon dioxide is readily released into the threatened area.

So, whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today . . . tell us about your particular fire hazards. Our experience is at your disposal . . . no obligation of course.

C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY

NEWARK 1 • NEW JERSEY

Sales and Service in the Principal Cities of United States and Canada

Affiliated with Pyrene Manufacturing Company

MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT

Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

New Equipment

(Continued from page 184)

chart combined with pneumatic control is desired.

This instrument has a 10 per cent proportional band, a 150 per cent proportional band, and automatic reset. 150 per cent proportional band and manual reset.

Minneapolis-Honeywell Regulator Co, Minneapolis, Minn.

MORE NEW PRODUCTS about which you should know

General Electric Co, Schenectady 5, N. Y., is now offering its Tri-Clad line of single-phase, capacitor, induction motors with **resilient base construction.** . . . Bently-Harris Manufacturing Co, Conshohocken, Pa., is manufacturing electrical **insulating tubing and sleeving** made of Vinylite resin plastisol and braided glass fibers.

Blackhawk Industries, Dubuque, Iowa, have introduced a one-hole **conduit strap** which snaps onto conduit and holds in position. . . . Thomas & Betts Co, 68 Butler St, Elizabeth, N. J., is manufacturing a new line of **wire terminals.** Units are integral, one-piece assemblies combining a metallic portion that grips both wire and insulation, and a nylon terminal insulator.

The Steber Manufacturing Co, Broadview, Ill., announces the addition of three new **junction boxes** to its line of Steberlites. A 4 in. round with six tapped openings, 3¼ in. round with four tapped openings, and a 4 in. round with six tapped openings plus tapped cover plate. . . . The Okonite Co, Passaic, N. J., has available an inexpensive **moisture seal** for terminating multi-conductor sheathed cables. This seal is cone shaped to receive filling compound.

Westinghouse Electric Corp, Pittsburgh 30, Pa., is manufacturing a new **Life-Linestarter** for improved starting and control of machine tools, presses, and other equipment used in mass production industries. . . . Hotpoint Inc, Chicago 44, Ill., is making an automatic non-clogging **food waste disposal unit** which has a shredding mechanism that rotates in either direction.

They're Clean...and Safe!

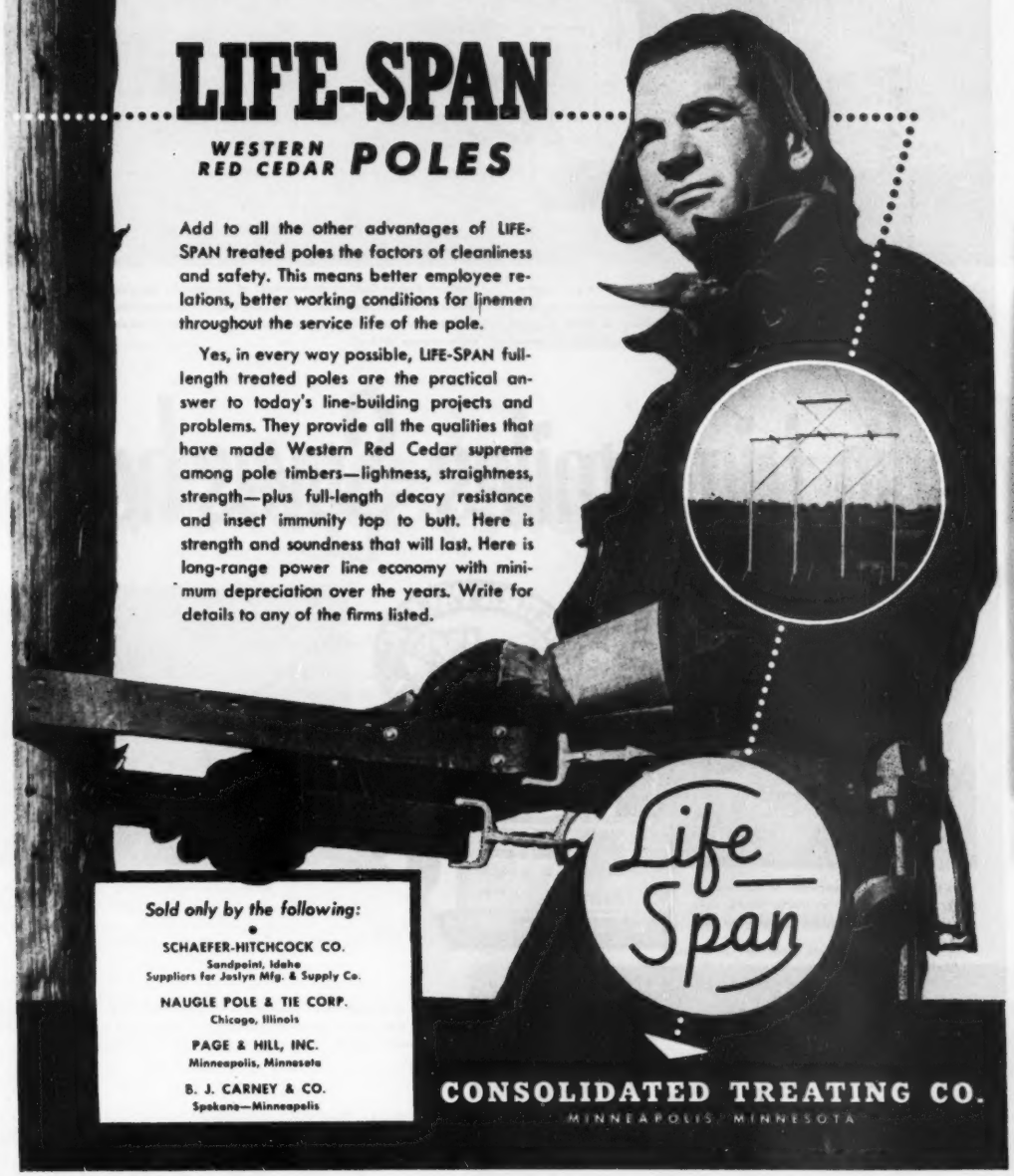
THAT'S WHY LINEMEN, TOO, PREFER...

LIFE-SPAN

WESTERN RED CEDAR POLES

Add to all the other advantages of LIFE-SPAN treated poles the factors of cleanliness and safety. This means better employee relations, better working conditions for linemen throughout the service life of the pole.

Yes, in every way possible, LIFE-SPAN full-length treated poles are the practical answer to today's line-building projects and problems. They provide all the qualities that have made Western Red Cedar supreme among pole timbers—lightness, straightness, strength—plus full-length decay resistance and insect immunity top to butt. Here is strength and soundness that will last. Here is long-range power line economy with minimum depreciation over the years. Write for details to any of the firms listed.



Sold only by the following:

SCHAEFER-HITCHCOCK CO.
Sandpoint, Idaho
Suppliers for Joslyn Mfg. & Supply Co.

NAUGLE POLE & TIE CORP.
Chicago, Illinois

PAGE & HILL, INC.
Minneapolis, Minnesota

B. J. CARNEY & CO.
Spokane—Minneapolis

CONSOLIDATED TREATING CO.
MINNEAPOLIS, MINNESOTA

2-Way Radio

Underbuilding circuit on existing line in desert country. This service truck and crew are 30 miles northeast of Sierra's base station at Lovelock. Mobile receiver on truck is open continuously to pick up possible emergency calls to other parts of district. Battery drain is held at minimum by switching off transmitter filaments. Value of radio communication increases wherever topography or weather make land line maintenance difficult.

Radio trims miles-Saves hours-

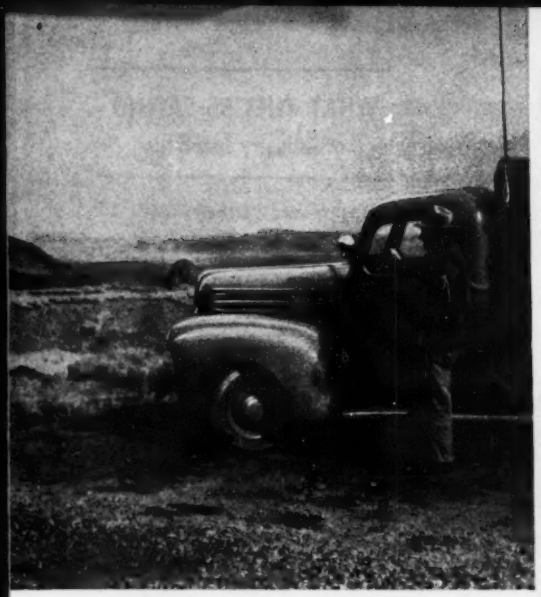
Homes get quick service when trouble trucks are dispatched by radio. More calls per day with same gasoline consumption cuts fleet costs.

SIERRA PACIFIC POWER CO.

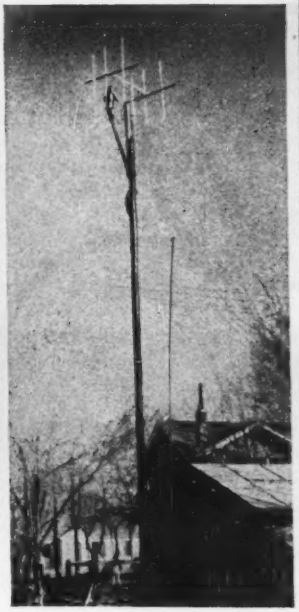
At Reno headquarters, service center director Lauritz Lund operates well-ordered communications system, controls 8 base stations and 50 mobile units in 15 counties.

▲ **Six rich valleys** of valuable farm and ranch land comprise Sierra's southern area. Ranch customers are pleased with prompt service typified by Bob Shannon (above) dispatching line trucks from Carson City.

Historic Donner Pass forms background behind division superintendent in radio car. Sierra's 3 most important transmission lines cross this pass and year-round communication is vital. Note 120 kv structure at right.



Extending 300 miles to the horizon, Sierra substations and sub-transmission lines cover rough mountain-desert terrain. Base station at Lovelock is 100 miles from this truck, but General Electric FM beam rides above static, delivers clear signal.



Line fault repairs in Carson Valley are completed by crew summoned via radio. 60' antenna (left) beams signals to trucks as far away as 110 miles.

to serve rugged mountain area!

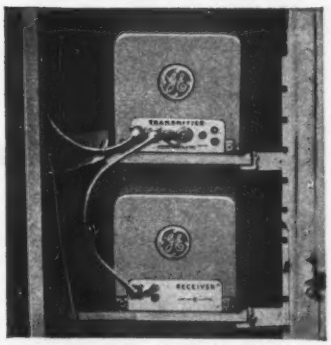
Sierra Pacific's mobile radio system ties together vast 15-county operation

To get more customer service per mile from its trucks and cars, this western utility makes profitable use of the latest in General Electric 2-way radio equipment. With eight base stations and 50 mobile units scattered over 15 counties, communication across rough terrain is no longer a problem.

Utility management knows the value of rapid servicing to hold customer satisfaction and cut line maintenance costs. Fast service demands fast communication, and G-E engineers are specialists at public service communication problems.

ASK YOUR G-E COMMUNICATIONS MAN

He has complete case history facts on what this equipment has done for other utilities. Why not let him show you how it can help your company? There's no obligation. Call the G-E office in your city or write us: *General Electric Company, Section 1991-1, Electronics Park, Syracuse, New York.*



Quality components are standard in G-E equipment. Mobile units shown are mounted in special compartment of service truck.

You can put your confidence in—

GENERAL ELECTRIC

J. Neils Lumber Company

Look to the West for transmission and telephone poles... To western Montana, where much of America's finest virgin timber is located...To the J. Neils Lumber Company plant at Libby.

Long a quality manufacturer of forest products (since 1895) J. Neils is a major producer of power and telephone poles.

At Libby, Montana, in the heart of a great forest empire, J. Neils manufactures and treats the poles that come from magnificent stands of Western Larch, Lodgepole Pine and Douglas Fir. This modern pole treating plant measures up to the highest quality standards in men, materials, equipment and methods.

An illustrated folder on J. Neils treated poles, and information regarding their application to your requirements, will be furnished gladly on request.

J N **J. Neils Lumber Company**

Pole Division: LIBBY, MONTANA

WHAT THEY'RE SAYING
at industry meetings

Engineers and "Other Men"

Allen Will Harris, *public relations consultant, before the Engineering College Council.*

Four special problems in public relations—"anything you do that affects what another man thinks of you"—now confront engineering research directors:

1. Security regulations which prohibit normal communication between the employee and his neighbor, the organization and its community, the scientist and his colleague, and between science and the lay public.

2. The time scale of major research is dangerously misunderstood; results cannot come overnight. The gap between what competent technical men can do and what self-promoters claim can be done is becoming wider every day.

3. An increasing amount of research is dedicated to the development of materials and weapons of war. Scientists may find, when world emphasis changes, that they have become "merchants of death."

4. No species is more difficult to organize and manage than the modern technical man and scientist, because he may fail to realize that problems cannot be solved without regard for human nature.

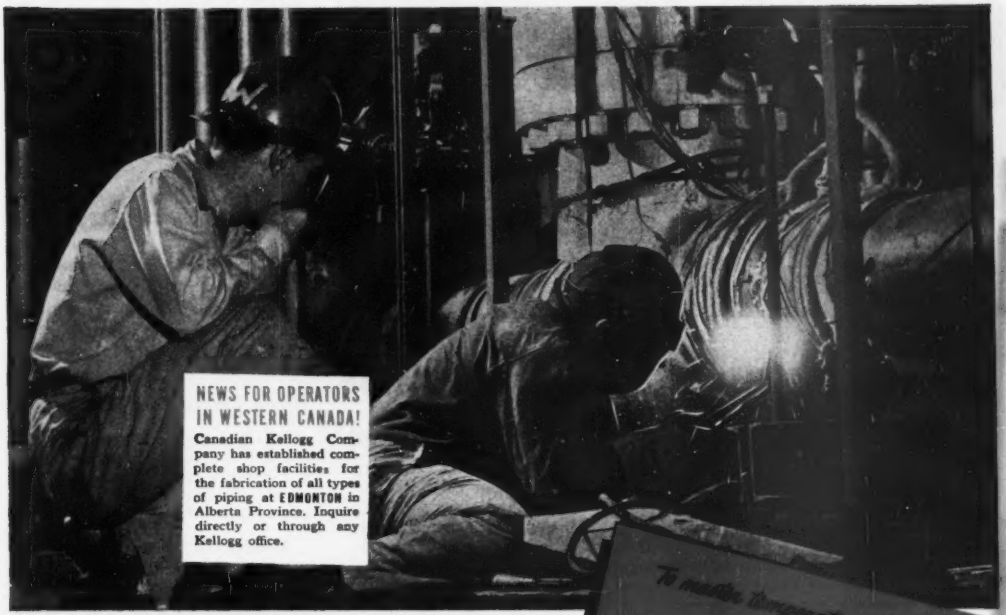
U. S. Technical Manpower

Dr Eric A. Walker, *executive secretary, Research and Development Board before the Engineering College Research Council.*

The nation's scientific and technical manpower resources now total some 575,000 persons, of whom an estimated 25% are equipped to do research. The 25% figure represents roughly 130,000 researchers, of whom about 25,000 are employed full time by the government, 70,000 by industry, and 35,000 by colleges and universities. The total number of engineers and scientists now required by the department of defense research program of $1.1 billion rounds out to 56,000, or 43% of the total national supply. It is expected that in 1952 this percentage will rise to 52, with the total requirement of 68,000 technically trained personnel. If the re-

Note: behind this arc . . . some 80,000 hours!

. . . when this job-site welder strikes his first arc on your new power piping system, his welding rod has behind it some 80,000 hours of experience . . . specific experience in welding chrome-moly hi-pressure, hi-temperature piping for utility power installations. That's Kellogg's background for the highly specialized power installations of today. Add to this Kellogg's experience in heat treatment and non-destructive testing of thousands of these alloy welds. This total specialized experience is why more and more of the critical piping systems are specified "main steam and reheat piping by M. W. Kellogg".


NEWS FOR OPERATORS IN WESTERN CANADA!
Canadian Kellogg Company has established complete shop facilities for the fabrication of all types of piping at EDMONTON in Alberta Province. Inquire directly or through any Kellogg office.

Special studies of unusual problems such as graphitization to assure long life and low maintenance.

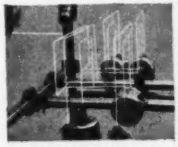
Metallurgical research by recognized specialists who have made major contributions in this field.

KELLOGG
50th ANNIVERSARY
1901 - 1951

To refine temperatures, pressures and chemicals use

M. W. KELLOGG

piping and process equipment



Exclusive Equipment for accurately analyzing stresses in piping and providing unique data for critical installations.

Complete facilities for the fabrication of steel products from simple forgings to specially cast bi-metallic devices.

Top welding performance in shops and in the field by welders accustomed to working under X-Ray checks.

Quality control, devised by metallurgical experts, embracing forming, heat treating and non-destructive testing.

Pressure Vessels
Vacuum Vessels
Fractionating Columns
Drums and Shells
Heat Exchangers
Process Piping
Bends and Headers
Giant One-Piece Bends
Forged and Welded Fittings
Radial Brick Chimneys

★

The M. W. Kellogg Company, (A Subsidiary of Pullman Incorporated) — Offices in New York, Jersey City, Buffalo, Los Angeles, Tulsa, Houston, Toronto, London and Paris.

high efficiency
AEROTEC
DUST COLLECTORS
Partially erected collector showing inlet, outlet and dust discharge passages.
New Niagara-Mohawk Power Corporation Dunkirk Steam Station, equipped with Aerotec Dust Collectors.
assure your plant the same protection given the new

NIAGARA MOHAWK POWER CORPORATION

Dunkirk Station . . . and a duplicate Albany Plant

At the new Dunkirk Steam Station of Niagara Mohawk Power Corporation, two reheat steam generators of 670,000 lb. per hour capacity are pulverized fuel-fired. Dust collection for this station is handled by Aerotec, Design 3 RAS Collectors, and a duplicate system is under construction for the new Albany Steam Plant . . . making a total of eleven Niagara-Mohawk boilers to be equipped with Aerotec Dust Collectors.

The collectors for Dunkirk and Albany consist of 84 "Unit Building Block" elements completely assembled at the factory for easy erection in the field. The small diameter tubes, of permanent molded aluminum construction, have proved their extremely high collection efficiency and long life on hundreds of installations. Their light weight cuts steel requirements for supporting structure, and makes possible roof installations with a minimum of reinforcement. The light weight tubes also reduce erection costs.

Aerotec efficiencies meet or exceed the requirements of most dust ordinances today. Evenly spaced tube outlets provide excellent inlet flow conditions for an AEROTEC electrical secondary — should future ordinances require still higher efficiencies.

Write for the new Design 3 RAS Catalog No. 601.

Project and Sales Engineers

THE THERMIX CORPORATION

GREENWICH, CONNECTICUT

(Offices in 28 Principal Cities)

Canadian Affiliates: T. C. CHOWN, LTD.
1440 St. Catherine St., W., Montreal 25, Quebec • 50 Abell St., Toronto 3, Ontario

THE AEROTEC CORPORATION

GREENWICH, CONNECTICUT

Manufacturers of mechanical dust collectors, electrical precipitators, air cleaners, industrial integral dust collectors, gas-oil scrubbers and dust reclaiming equipment.

search personnel requirements of the Atomic Energy Commission and other agencies engaged in research are included, the requirement reaches a staggering 65%.

Selling With Light

C. M. Cutler, *Nela Park, Cleveland, before the International Commission on Illumination at Stockholm, Sweden.*

Modern store lighting is a primary factor in merchandising. Besides making its own contributions to selling, lighting at the same time enables the merchant to utilize more effectively all other appointments and components of his establishment.

There are several zones to be illuminated; the traffic zone, the display zone, the selling zone, and the overhead zone. These should be integrated. Endless variety of available systems, patterns, and combinations gives opportunity for obtaining lighting that is fitted to any merchandising requirement, assuring individuality and distinction, so important in attracting and holding clientele.

Home Lighting Progress

Myrtle Fahsbender, *director of home lighting, Westinghouse Electric Corp, at the National Technical Conference of the Illuminating Engineering Society, Washington, D. C.*

Members of the lighting profession should show more progress in utilizing home lighting know-how and in creating a demand for good home lighting. Americans have the best lighted homes in the world, but they fall short of attainable standards of perfection when the resources available here are compared with those which are available in Europe.

An awareness of home lighting is apparent at the design level in Europe. The trend is toward simplicity in new lamp and fixture designs. More ceiling and wall fixtures are used in Europe than here. Built-in lighting is at a minimum. Fluorescent lighting is just being accepted, and mostly in kitchens.

We still have much to do. And the fact that the average per capita income here is two to three times greater than in Europe should be an added incentive to the lighting profession to step up its efforts to gain acceptance for perfection in home lighting.

REDUCE ALL

3

and get Higher Quality

1. Cable Cost
2. Installation Time
3. Frequency of Replacement

By Switching to ANSONIA Ankoseal®

ALL-PLASTIC, LIGHT-WEIGHT CABLE

More and more utilities are switching to Ansonia Ankoseal for—

Supervisory Control Cable
Station Control Cable
Street Lighting Cable
Meter Cable

The resulting advantages are—

lower cost in most cases
reduced installation time and effort
reduced frequency of replacement

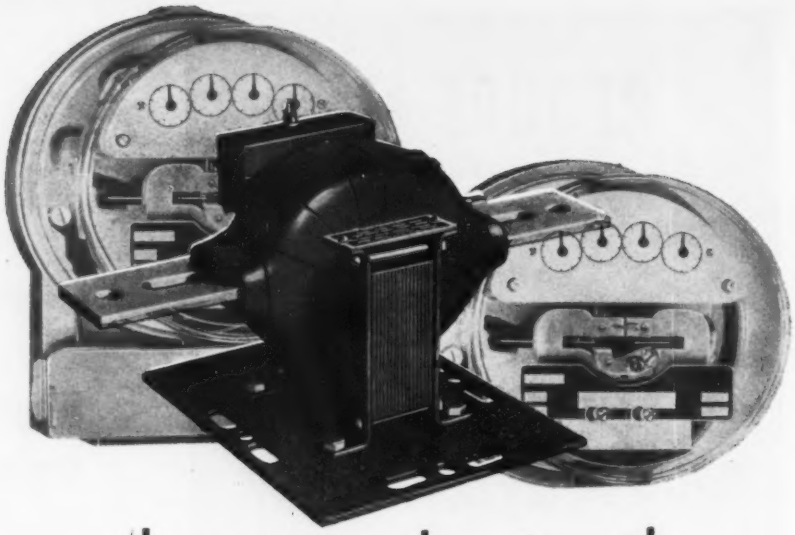
We'll welcome an opportunity of demonstrating these advantages to you by showing actual service records of well-known public utilities.

Write for additional information.

THE ANSONIA ELECTRICAL [illegible]

[illegible] PART OF NOMA ELECTRIC CORPORATION

ANSONIA, CONNECTICUT



Meters that tell the truth ...

DEPEND ON ACCURATE INSTRUMENT TRANSFORMERS

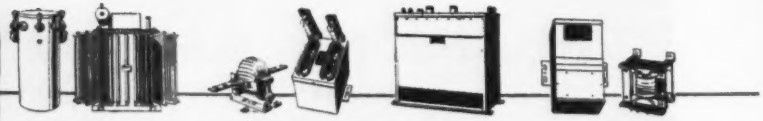
...and accuracy is the watchword at The Standard Transformer Company, where Current, Potential and Metering transformers are built to meet the highest NEMA, AIEE and EEI requirements.

Most economical to use . . . type NAS current transformer (shown above) enables users to stock only a few sizes to cover the entire field of low voltage measurement. This is just one of the complete line of instrument transformers that are "Standard-built" to save you money.

Write for BULLETIN S-501-B ... It's New

Packed with technical information on Current, Potential and Metering transformers, a 32-page bulletin complete with detailed drawings, accuracy limits, ratio and phase angle curves is ready for you. Every type of instrument transformer produced by The Standard Transformer Company is illustrated and described fully. You can have Bulletin S-501-B on your desk by merely writing for it today.

Transformers FOR EVERY APPLICATION

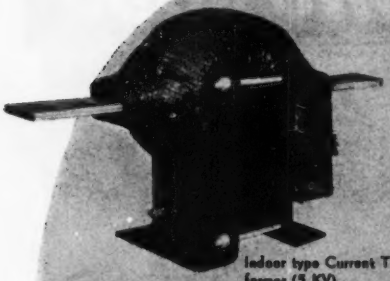


Liquid filled (sizes up to 10,000 KVA and 72 KV inc.)

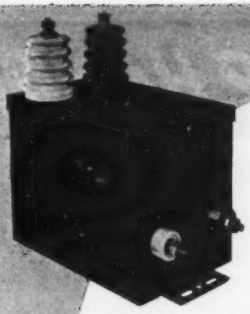
Instrument transformers (for use on circuits up to 72,500 volts, inc.)

Dry type (up to 1000 KVA and max. voltage ratings of 4800.)

Control transformers (compound filled or open type.)



Indoor type Current Transformer (5 KV).



Indoor type unfused Potential Transformer 200 VA, 2400/120 volts, 60 KV FW impulse level.

Indoor type Potential Transformer with Current limiting fuses, 200 VA, 2400/120 volts, 45 KV FW impulse level.

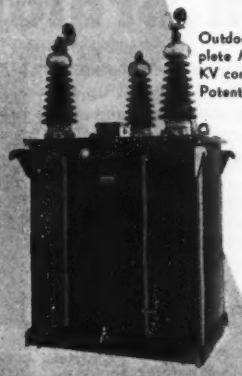
Standard

TRADE MARK ®

CURRENT, POTENTIAL AND METERING TRANSFORMERS

. . . Indoor and Outdoor Current and Potential Transformers . . . Metering Sets . . . Instrument Transformers for Special Applications.

Outdoor type, OISC Potential Transformer for 34.5 KV service.



Outdoor type, OISC complete Metering set for 69 KV containing Current and Potential elements.

Outdoor type, OISC Current Transformer for 46 KV service.

The Standard Transformer Co.

WARREN, OHIO

REPRESENTATIVES IN PRINCIPAL CITIES

SPEED UP HANDLING JOBS

with Bethlehem Braided Slings

If some of your lifting and moving jobs are crying for faster action, Bethlehem strongly suggests that you consider braided slings.

This type of sling has the very real advantages of high flexibility, resistance to kinking, and general ease of handling. All these factors contribute to speed in rigging and a faster flow of material. Then, too, Bethlehem braided slings are "huggers"—fit snugly around the contours of the load—and they can be made in sufficiently large sizes to have tremendously high strengths.

Of course, the braided sling is but one of the many choices that Bethlehem makes available. If you feel that your needs are better served by a nonbraided type—either standard or special—our plant can readily handle your order to specifications. Remember: we are fully set up to furnish *every* class of sling, and our designing and manufacturing units are unsurpassed anywhere in the country.

Here's a suggestion: send us your prints, drawings, or sketches showing the kind of handling problem you have in mind. Braided slings may well be the answer; but if another type seems more logical for your application, we'll tell you so frankly. Before you take this step, however, you may prefer to look over our slings catalog. Ask for a free copy; it will be mailed promptly.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

±10% Regulation... in Sixteen 1¼% Steps

with New URL-16 Voltage Regulator — An Important Addition to the URL-8 Line

ASSURES MORE REVENUE FROM HEAVILY LOADED RURAL AREAS

Here's a new, low-cost answer to economical regulation in rural or suburban areas . . . at the substation or on the line. This new regulator increases the "URL" line for application in locations where a 10% range is not sufficient, and where a ±10% regulator is required. Sixteen 1¼% step operation meets these requirements under any load condition, at minimum cost.

Check these moneysaving features:

10% Regulation, Raise and Lower, in 16 Steps of 1¼% Each—Combines light weight for single-pole mounting with regulation for substation application. A double-purpose feature that cuts costs. Regulator retains every outstanding "URL" feature.

Simple Tap Changer, with Reversing Switch for ±10% Regulation—Cuts maintenance. Assures positive arc interruption and minimum voltage variation during tap changing period.

Package Control Mounted in Improved Control Cabinet—Operating relays are mounted in flexitest chassis. Separate resistance and reactance line drop compensator provides rated line drop compensation with regulator carrying only 67% rated load. All mounted in a cabinet with door hinged to provide workbench when fully opened.

For Further Information, call your Westinghouse representative, or write. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

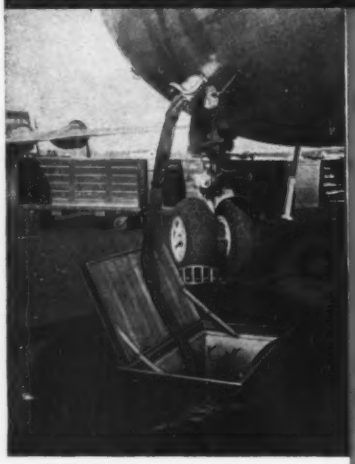
J-70602

YOU CAN BE SURE...IF IT'S Westinghouse

VOLTAGE REGULATORS

FOR A PLAYING FIELD...

...OR AN AIRFIELD



Neoprene-jacketed cable assures long-lasting, dependable service

For athletic field or airport lighting . . . installed overhead or underground . . . neoprene-jacketed cable is *right* for the job. Installations that have been up for over eleven years prove continuous exposure to glaring sun has little effect on neoprene. Soil acids won't cause it to rot underground. Galvanic action, destroyer of metal sheaths, won't harm neoprene. Even on oil and gasoline soaked runways, neoprene won't become soft and sticky. It provides lasting protection for the insulation under toughest conditions.

So ask your supplier about neoprene-jacketed cable. Leading manufacturers make it in single or multiple conductor types, in voltage rating to fit your requirements. You'll find this cable costs less to maintain and requires fewer replacements . . . whether the service is rural, urban or industrial. For some ideas about new neoprene applications that may help you, send for "The Neoprene Notebook." No charge, of course. Write: E. I. du Pont de Nemours & Co. (Inc.), Rubber Chemicals Division G-9, Wilmington 98, Delaware.

NEOPRENE

The rubber made by Du Pont since 1932

DUPONT

HERE'S PROOF

Summary of Portland General Electric Company's Report* on Purification of Transformer Oil

"On a typical job of oil conditioning, the following information is given for a 7,500-kva, 60,000/2,400-volt water-cooled transformer with conservator type oil seal . . . total oil in transformer, 2,000 gallons":

	OIL CONDITION	
	As Found	*As Left, After Purification*
Neutralization No. (Acidity)	0.70	0.06
Interfacial Tension, dynes	14.4	25.8
Dielectric Strength, volts	30,000	42,000
General Classification	Bad	Good

*Complete report was presented before the AIEE Pacific General Meeting in Portland, Oregon, August, 1951, by Mr. Delmar L. Brown, Superintendent, Testing Department, Portland General Electric Company.

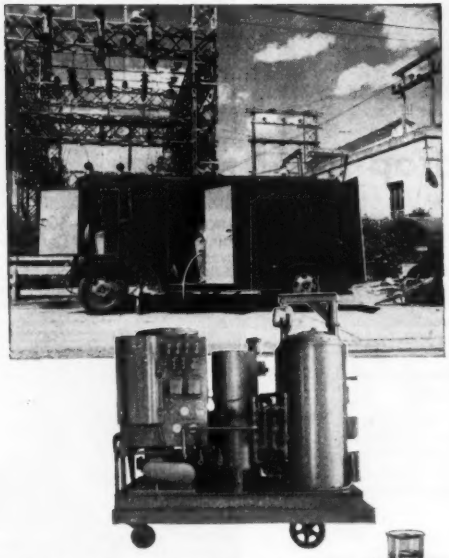
Houdaille *Purivac*

Restores Used Transformer Oil to New Oil Specifications

A Houdaille PURIVAC (shown below) was installed by Portland General Electric Company in a 4-wheel trailer equipped with a small testing laboratory.

Used to purify and test transformer oil in the field, Portland engineers reported to American Institute of Electrical Engineers that this "mobile refinery":

1. Restores used transformer oil to condition very nearly equivalent to new oil
2. Provides hot, super-dry oil for washing down transformer core and case
3. Does a good purification job without taking transformer out of service



Portland General Electric Company's "Mobile Refinery" is built around Houdaille PURIVAC unit. The equipment is easily transported to any location.

WRITE TODAY for complete information and specifications on the Houdaille PURIVAC . . . the only portable unit that provides *complete, economical purification* of insulating oil for transformers, circuit breakers and other oil-filled electrical equipment. Equally efficient in the field or at a central station. *Designed and manufactured exclusively by*

CL[illegible] OIL ENGINEERING

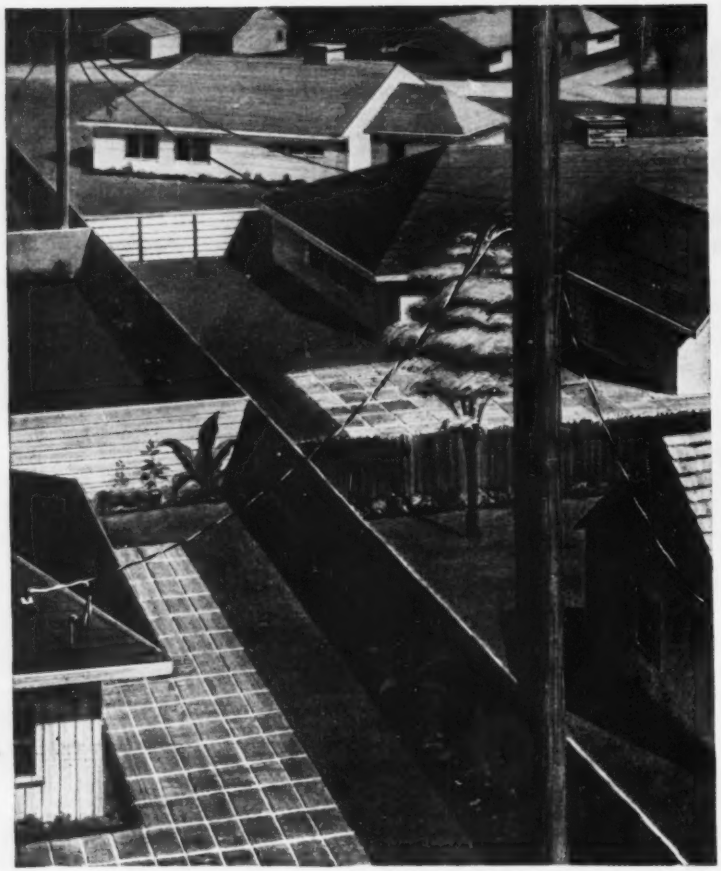
HONAN-CRANE CORPORATION

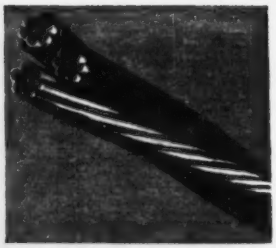
819 WABASH AVE.

LEBANON, INDIANA

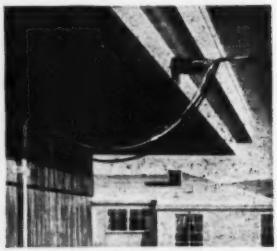
A Subsidiary of

HOUDAILLE-HERSHEY CORPORATION





THREE-IN-ONE—Triplex is a single cable made up of three wires—two neoprene or polyethylene covered wires cabled about the bare neutral messenger. Light in weight, free-stripping, clean to handle.



FEWER ACCESSORIES! Triplex cable requires only one house knob instead of three. It reduces cluttered appearance on houses and community pole lines.

ANOTHER COST-SAVER—Kaiser Aluminum Weatherproof Conductor—neoprene or polyethylene covered—cuts costs 30 to 40 per cent. Resists moisture, abrasion, fungi. Clean stripping, and eliminates festooning.

TECHNICAL ASSISTANCE—Service engineers with years of experience in the conductor field will gladly provide technical assistance. Call any Kaiser Aluminum office. See your Classified Directory.

New triplex service drop cuts costs 20 to 40 per cent!

COMPARE the advantages of Kaiser Aluminum triplex service drop cable over conventional open wire construction...

Triplex needs fewer accessories. Light weight and low wind and ice loadings reduce tension on house and pole, permitting longer spans, cutting maintenance. Installations are faster, easier.

Result: *Savings of 20 to 40 per cent! Plus* increased clearances, fewer contacts with trees, thanks to the single cable. *Plus* a far neater appearance.

FREE BOOKLET gives complete engineering data on new Kaiser Aluminum covered conductor—both weatherproof and self-supporting. Send for it today! Sales offices in principal cities. Plant office: Newark, Ohio. Kaiser Aluminum & Chemical Sales, Inc., Oakland, California.

Also distributed by: General Electric Supply Corporation, Line Material Company, Mine & Smelter Company, Tafel Electric and Supply Company, Westinghouse Electric Supply Company.

Kaiser Aluminum

Setting the pace . . . through quality and service

NO GUESSING ABOUT IT—

THE DE LAVAL PORTABLE OUTFIT IS THE SAFEST WAY TO PURIFY INSULATING OIL

When you purify insulating oil by means of centrifugal force with a De Laval portable outfit, water is ***continuously removed*** from the oil. As the water discharges from the bowl of the Oil Purifier, it can never collect and recontaminate the oil. No danger, ever, that a batch of oil in the process of purification will go in an instant from a high to a low dielectric test!

There are many other advantages of the De Laval method of purifying insulating oil. For example, as purification is effected at low temperatures, the high dielectric value of the oil is maintained longer. Again, the heater is of the type that cannot carbonize the oil.

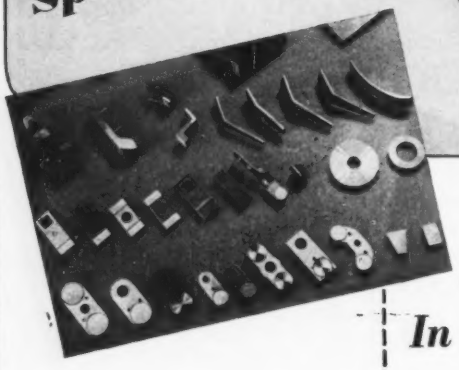
Get the whole De Laval story. Write for details.

THE DE LAVAL SEPARATOR COMPANY
Poughkeepsie, New York 427 Randolph St., Chicago 6
DE LAVAL PACIFIC CO., 61 Beale St., San Francisco 5
THE DE LAVAL COMPANY, Limited, Peterborough, Ont.

DE LAVAL

INSULATING OIL PURIFIERS

Result Beyond Specification !



Exclusive Techniques Assure Top Performance In Elkonite Contact Materials*

ELKONITE CONTACTS

Elkonite contacts are made by the only method which permits the combining of the desirable features of basic metals which cannot be alloyed. By this means, the high melting points of tungsten, molybdenum, or their carbides, can be combined with the current-carrying ability of silver or copper.

Elkonite materials are best known for their hardness, resistance to mechanical wear and impact, resistance to erosion by arcing, and resistance to sticking.

**Reg. U. S. Pat. Off.*

***The ability of a contact material to withstand the erosion of an electric arc.*

The secret of Elkonite superiority is the technique by which this composite material is made to retain such a high degree of the desirable properties of each of the constituent metals. Mallory engineers have so developed this art that no other contact material has equalled Elkonite in all four features that spell top performance every time . . . conductivity, impact strength, AR** factor, and heat resistance.

Thus, Elkonite . . . the result of precision compounding to take the best advantage of specific properties . . . can deliver an extra measure of satisfaction in service.

That's result beyond specification!

Mallory contact know-how is at your disposal. What Mallory has done for others can be done for you.

In Canada, made and sold by Johnson Matthey & Mallory, Ltd., 110 Industry St., Toronto 15, Ontario

Electrical Contacts and Contact Assemblies

P. R. MALLORY & CO. Inc.

MALLORY

P. R. MALLORY & CO., Inc., INDIANAPOLIS 6, INDIANA

SERVING INDUSTRY WITH

Electromechanical Products
Resistors *Switches*
TV Tuners *Vibrators*

Electrochemical Products
Capacitors *Rectifiers*
Mercury Dry Batteries

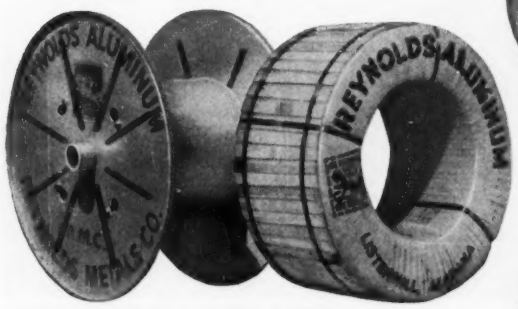
Metallurgical Products
Contacts *Special Metals*
Welding Materials

NOW 4 Reynolds Master Reels Do the Work of 100 Wooden Reels

Handle ACSR quicker, more economically
Eliminate inventory and exchange

Almost every cable user wants to convert to the modern Reynolds ACSR Master Reel and Coil system. And no wonder! These smart operators eliminate *all* problems connected with wooden reels. The Reynolds Master Reel eliminates handling, storing, record keeping, as well as cutting damage cost to a minimum.

Reynolds Master Reel and Coil are easily assembled by linemen right on the job.



Reynolds Master Coils hold the same amount of conductor as conventional wooden reels. The cable is carefully waterproofed, lagged and banded—completely protected against rough handling. The Reynolds Master Reel is all metal, quickly taken apart and put back together around the Master Coil. It is far sturdier than a wooden reel and can be used over and over again.

Find out about this revolutionary method of solving your cable and reel problems. You will cut your costs with this time- and money-saving cable handling method.

Reynolds Master Reel and Coil save time, money, labor —are sturdier than wooden reels.

FREE ACSR MANUAL FOR ENGINEERS CONTAINS COMPLETE INFORMATION, CHARTS AND TABLES. Please request this booklet on your business letterhead.

For Complete Information

see your Reynolds distributors listed below or write direct to Reynolds Metals Company, 2584 South Third Street, Louisville 1, Kentucky.

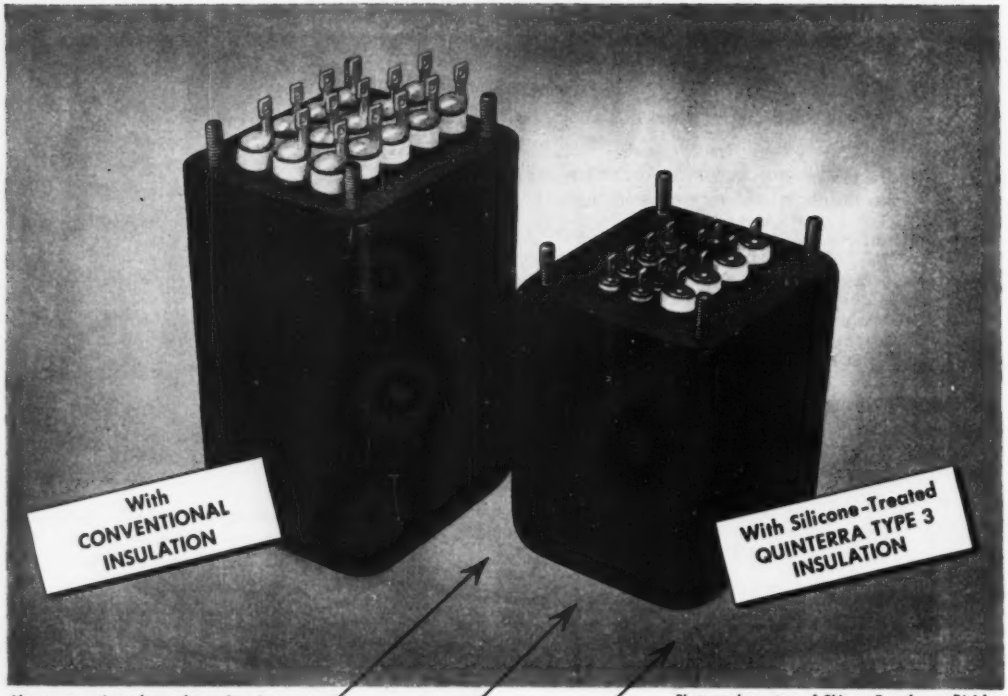
Westinghouse Electric Supply Co., New York, N.Y. (And branches) • North Coast Electric Co., Seattle, Wash. Griffin Manufacturing Co., Dallas, Texas • Southern Electric Supply Co., Houston, Texas • Williamson Sales Co., Shreveport, Louisiana (And branches) • California Electric Supply Corp., San Francisco, California

REYNOLDS METALS

REYNOLDS ALUMINUM

MODERN DESIGN HAS ALUMINUM IN MIND

Now available... Johns-Manville



Above comparison shows the savings in space and materials made possible by the use of silicone-treated Quinterra.

Photograph courtesy of *Chicago Transformer Division*, Essex Wire Corporation.

Saves on Size

Saves on Weight

Raises Overload Limits

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

silicone-treated

Quinterra*

TYPE 3

. . . a purified ASBESTOS high-temperature sheet insulation with important advantages for electrical equipment manufacturers

Silicone-treated Quinterra Type 3 is a high grade, Class H dielectric suitable for both interlayer and wire-wrapped insulation. It has outstanding moisture-resistance, high-temperature stability, and electrical characteristics—plus flexibility and adequate strength. Its unique combination of properties points the way to even greater compactness and even higher overload limits in many types of electrical devices . . . including air-cooled, inert gas and silicone-filled transformers.

High thermal-dielectric characteristics

Quinterra Type 3, like all treated Quinterras, is made from a completely inorganic base sheet of purified asbestos. The base sheet is of closed structure, has no holes, and has an inherent dielectric strength of at least 200 VPM. The silicone-treated base sheet maintains a dielectric strength of at least 350 VPM under continuous exposure to Class H maximum temperature of 180°C. The silicone treatment also provides high moisture resistance so the dielectric strength remains practically constant even under conditions of continuous high humidity.

*Quinterra is Johns-Manville's registered trade mark for its purified asbestos electrical insulation.

Excellent physical properties

Quinterra Type 3, is highly uniform in both texture and thickness—an important advantage in product design. Winding dimensions can be predicted accurately and much work can be eliminated in the final assembly. Quinterra is extremely flexible and very resistant to cracking or crazing. Actual use has proved that this insulation has sufficient mechanical strength for economical application in many electrical and electronic units.

Good laminating qualities

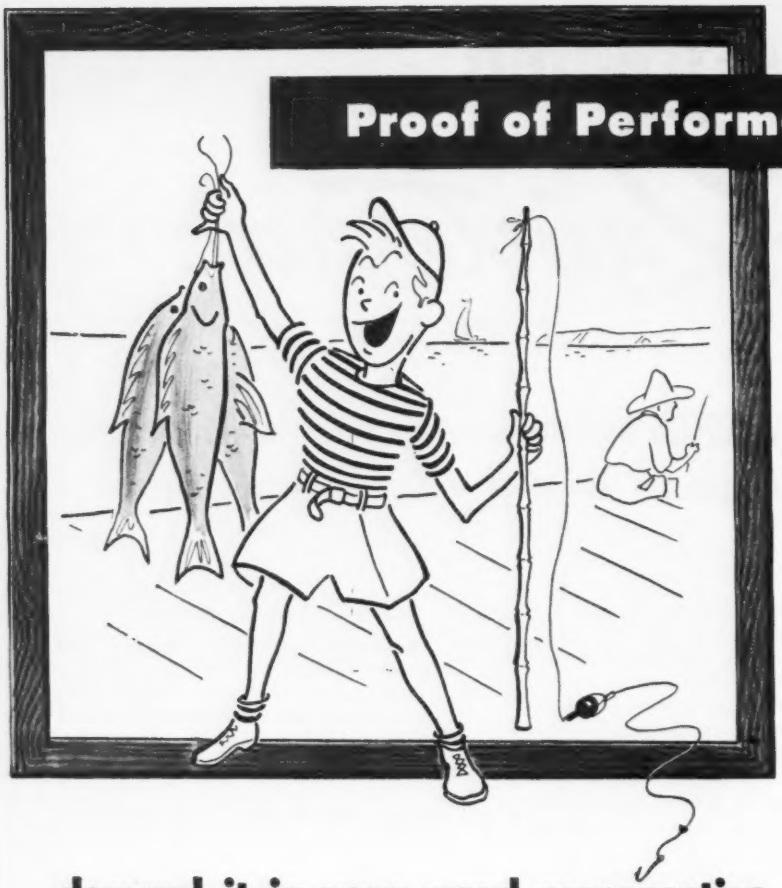
Like other Quinterra insulations, the new Type 3 may be successfully combined with other dielectric materials. It may be bonded to other inorganic materials such as mica or glass cloth.

Available forms

Quinterra Type 3 is supplied in sheets, rolls or tapes. Widths—¼" to 36"—can be cut to your specification. Available in various thicknesses from 3 to 9 mils.

If you have a problem you believe silicone treated Quinterra Type 3 might solve, you are invited to consult our staff engineers. We will gladly supply samples and additional information. Write Johns-Manville, Box 290, New York 16, N. Y.

Electrical Insulations



demand it in your wood preservative, too

Service records are the only conclusive evidence of the amount of extra life that a wood preservative can add. And Creosote Oil's performance is backed up by factual data gathered over the last 70 years.

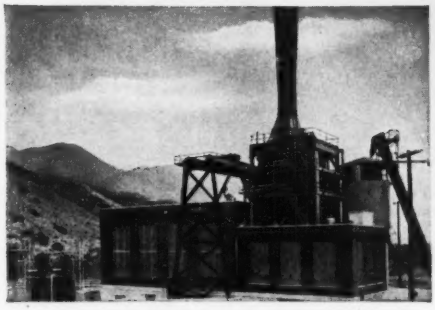
There's no reason to take chances on an unproved preservative when Creosote Oil has demonstrated—in actual service—its exceptional ability to extend the life of wood.

U·S·S Creosote Oil has been the subject of many service tests . . . has proved it has the toxicity and permanence needed for satisfactory results. You can rely on this proved preservative.

You can obtain immediate shipment of U·S·S Creosote Oil by rail or river from the world's largest tar distillation plant at Clairton, Pa. Contact our nearest office. United States Steel Company, 525 William Penn Place, Pittsburgh 30, Pa.

U·S·S CREOSOTE OIL

UNITED STATES STEEL



FROM THE WORLD'S *FIRST*—TO THE WORLD'S *LARGEST* OUTDOOR STEAM ELECTRIC STATION

Back in 1936, in Utah, Ebasco built the world's *first* outdoor steam electric station. Today Ebasco is building the world's *largest—in record time.* The four huge generating units of this giant installation on the Ohio River near Joppa, Illinois, will produce 650,000 kilowatts —36 times the output of the 1936 station—to power a new Atomic Energy Commission plant.

Electric Energy, Inc.*—a group of five major investor-owned utility companies which will operate the new station—engaged Ebasco to plan, engineer, design and construct the entire project. Within a few weeks after authorization, Ebasco had chosen the site, purchased all major equipment and started construction.

When completed, this plant will be another outstanding example of Ebasco engineering and construction. During the past half century Ebasco has completed more than one billion dollars worth of new plants for business and industry throughout the world.

We shall be glad to send you a copy of our brochure upon request. Address: Ebasco Services Incorporated, Dept. M, Two Rector Street, New York 6, N. Y.

EBASCO
ENGINEERS · CONSTRUCTORS · BUSINESS CONSULTANTS

Appraisal
Budget
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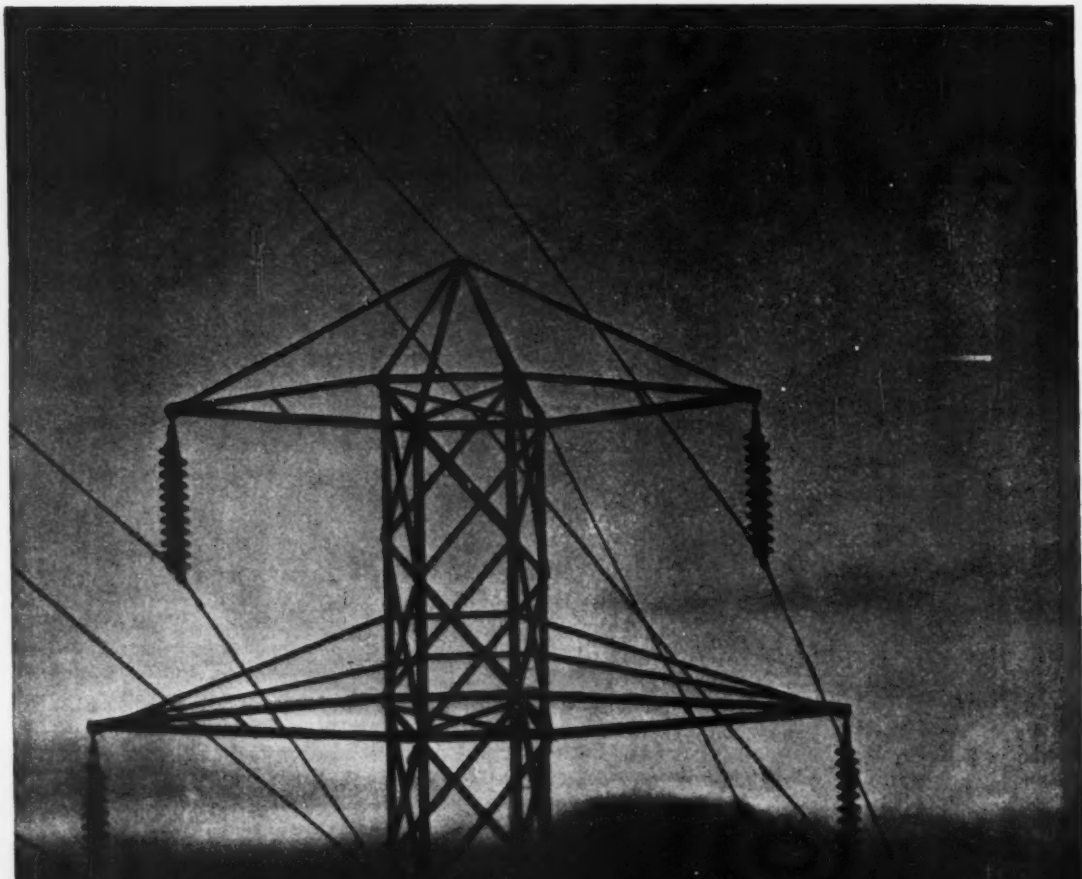
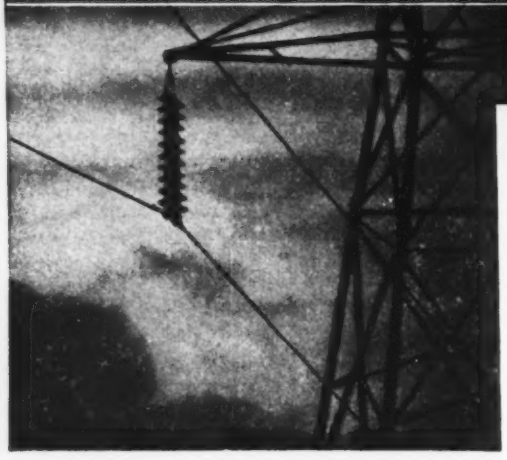


CP Diesel and Dual Fuel Engines

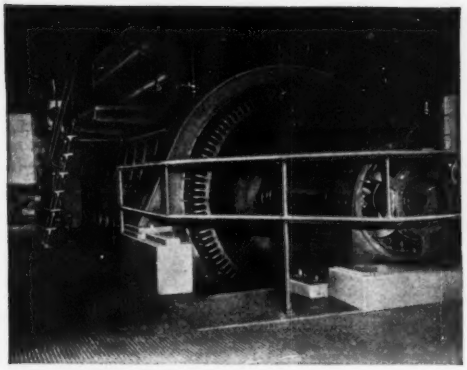


for every Public Utility purpose

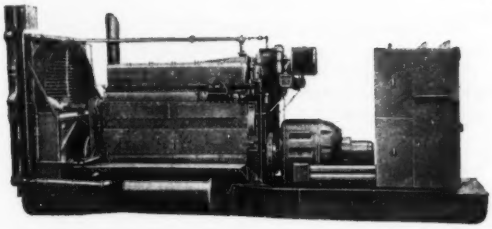
Available in sizes from 120 to 1750 horsepower, CP engines can be furnished either for straight Diesel or Dual Fuel operation. The CP line includes both normally aspirated and supercharged engines, all the latter incorporating the thoroughly dependable Elliott-Buchi Turbo-charger.

The engines illustrated are typical of many CP installations in public utility service.

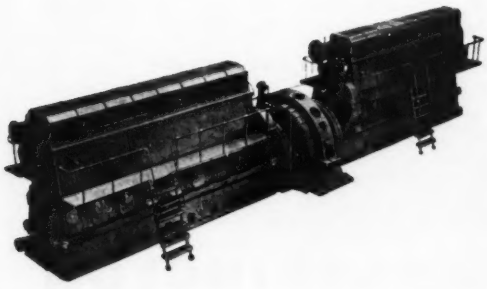
Write for further information



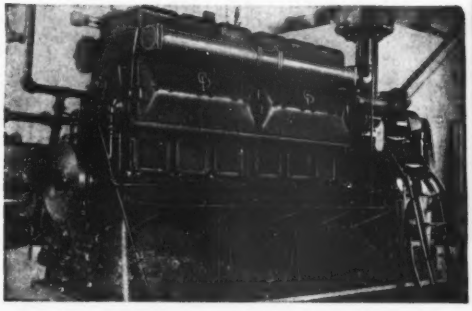
1650-hp Dual Fuel Generator unit in public utility plant – 327 rpm, 1150 kw.



500-kw CP Portable Generator unit for public utility emergency service.



Twin Engine Generator unit rated 2250 hp, 1500 kw.



A 175-kw Diesel Electric unit in a prominent utility plant, with more than 14,000 hours service to date.

CHICAGO PNEUMATIC TOOL COMPANY
General Offices: 8 East 44th Street, New York 17, N. Y.

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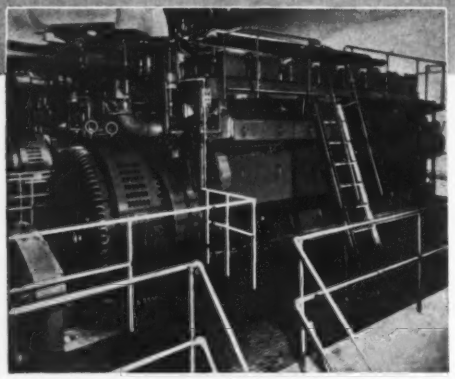
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

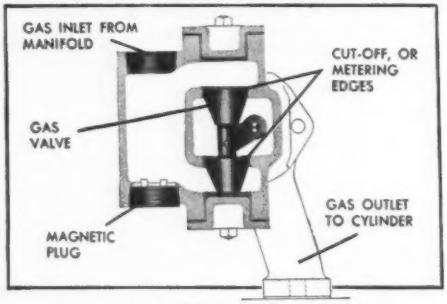
They're Handling Expanding Power Loads

The Fast, Low Cost Way:

Iowa Utility Company, Like So Many Others, Uses Worthington Dual Fuel Units For Uninterrupted Service On The Cheapest Fuel Available



A Worthington Supercharged Dual Fuel Engine in the Oskaloosa plant — part of the Iowa Power And Light Company System.



WORTHINGTON MICRO-METERING GAS VALVE
One for each cylinder

Used on Spark Ignition and Dual Fuel Engines — Governor controlled — Individually adjusted.

Assures: — Equal cylinder loading — Smooth running at all loads — Better speed regulation — Lower maintenance.

Full load operation, 24 hours a day, is routine performance for Worthington Dual Fuel Engines. They're designed and built to do just that — and they're doing it for power companies in communities all over the world.

They're saving money for their users every day, too, because of their Worthington-pioneered dual fuel feature that enables them to operate on gas or oil, or any combination of these fuels. Also, without losing load, they can instantly be changed over from one fuel to the other.

When gas is your fuel, only a very small amount of pilot oil is needed for ignition. Micro-metering valve (see drawing) on each cylinder provides equal distribution of gas for smooth, steady operation. Supercharging assures maximum economy through high thermal efficiency with either fuel.

BESIDES FUEL SAVINGS—

Lubrication and maintenance costs have been cut to a minimum through an effective system of "hot-spot" lubrication, according to users of Worthington Dual Fuel Engines. Why not get the whole story that proves *there's more worth in Worthington?* Write to *Worthington Pump and Machinery Corporation, Engine Division, Buffalo, New York.*

WORTHINGTON

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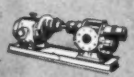
Diesel engines, 150 to 3,520 hp . . . gas engines, 175 to 3,520 hp . . . dual fuel engines, 225 to 3,290 hp.

Balanced Angle Compressors



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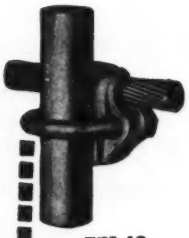
Cooling Water Circulating Pumps

Evaporative Type Engine Water Cooler

O.Z. KNOWS CONNECTORS

FROM THE GROUND UP

Whether in the depths of a mine or the towers of a skyscraper, wiring jobs done with O. Z. fittings *go in faster . . . stay in longer.* For typical reasons, check the advantages, below, of just two of the many O. Z. ground connectors. You'll see why engineers say— **"They're OK if they're *O. Z.*"**



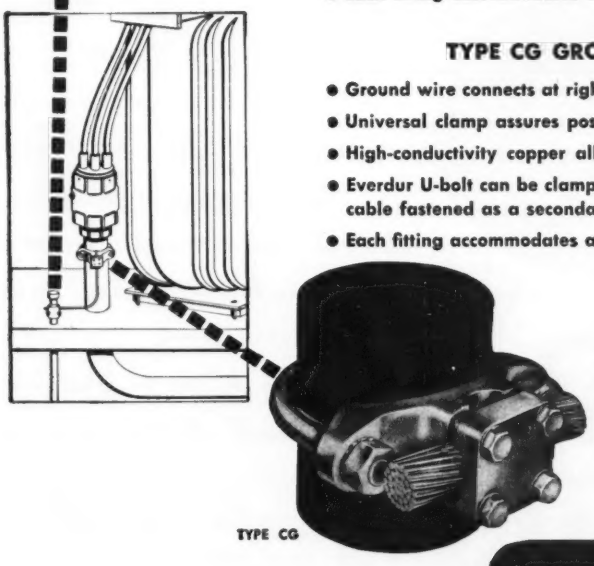
TYPE AG

TYPE AG GROUND CONNECTORS

- Top clamp plate is ribbed for strength . . . eliminates distortion.
- High-conductivity copper alloy . . . resists corrosion.
- Interlocking pivoted clamp insures maximum circular pressure.
- Single Everdur U-bolt secures cable to ground rod . . . reduces assembly time.
- Each fitting accommodates a wide range of cable sizes.

TYPE CG GROUND CONNECTORS

- Ground wire connects at right angles or parallel to pipe.
- Universal clamp assures positive contact in either direction.
- High-conductivity copper alloy . . . resists corrosion.
- Everdur U-bolt can be clamped in place on rod or pipe and ground cable fastened as a secondary operation.
- Each fitting accommodates a wide range of wire sizes.



TYPE CG

More and more electrical wholesalers are stocking O. Z. fittings. See your local distributor today. Write us for catalog detailing sizes, features, and prices of the complete O.Z. line.

CONDUIT FITTINGS • CABLE TERMINATORS
CAST IRON BOXES • SOLDERLESS CONNECTORS
GROUNDING DEVICES • POWER CONNECTORS

O.Z. ELECTRICAL MANUFACTURING COMPANY

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SAVE

You can now

Effective immediately, Westinghouse fluorescent lamps will be sold at new, greater discounts to quantity buyers. All types and sizes of fluorescent lamps come under this money-saving order: standard fluorescent tubes, slimlines, and circlines—you save on all!

In quality, these lamps remain unsurpassed! Their end-to-end brightness, their uniformity of color, and, above all, their dependable performance for thousands of hours add up to value that is not topped.

So, whether you buy a few tubes or a few thousand, whether you are a regular Westinghouse customer, or a prospect, take advantage of these important savings.

LIFE...

None burns brighter, none lasts longer than Westinghouse fluorescent lamps. For factories, stores, offices, schools or public buildings, their *lifetime* record is tops.

PERFORMANCE...

Since the introduction of Westinghouse fluorescent lamps, light output has been steadily increased, life lengthened, and price reduced. Today's new discounts are new, added proof of Westinghouse progress in lamp leadership.

VALUE...

Measured by any yardstick, whether quality of light output or lamp life, there's no better value for the money.

For details, call or write the Westinghouse sales office nearest you. See list at right. Westinghouse Lamp Division, Bloomfield, New Jersey.

CITY	ADDRESS	PHONE
Albany	454 N. Pearl St.	4-9135
Allentown	739 Hamilton St.	4-5188
Amarillo	301 Polk St.	7838
Atlanta	(Chamblee, Ga. 2260 Peachtree Ind. Blvd.)	21-3141
Baltimore	501 St. Paul Pl.	Plaza 0300
Birmingham	P. O. Box 1814	Homewood 2-7892
Boston	(Belmont, Mass., 30 Brighton St.)	BE 5-6020
Buffalo	814 Ellicott Sq. Bldg.	Washington 3966
Charlotte	1908 Liberty Life Bldg.	4-4674
Chicago	Mdse. Mart Plaza	Whitehall 4-3860
Cincinnati	207 W. Third St.	Garfield 2260
Cleveland	1370 Ontario St.	Cherry 1-7600
Columbus	262 N. 4th St.	Main 5527
Dallas	1918 Browder St.	Randolph 4161
Davenport	2212 E. 12th St.	3-2761
Dayton	32 N. Main St.	Adams 9153
Denver	910 15th St.	Keystone 8121
Des Moines	1400 Walnut St.	3-8264
Detroit	5757 Trumbull Ave.	Trinity 2-7010
Ft. Wayne	610 S. Harrison St.	Anthony 3421
Ft. Worth	1310 Electric Bldg.	Fortune 4086
Hartford	119 Ann St.	5-0851
Houston	1314 Texas Ave.	Charter 4691
Huntington, W. Va.	1029 7th Avenue	7146
Indianapolis	137 S. Pennsylvania St.	Market 2301
Kansas City	101 W. 11th St.	Harrison 7122
Little Rock	Woodrow & Roosevelt Rd.	5-2471

MONEY!

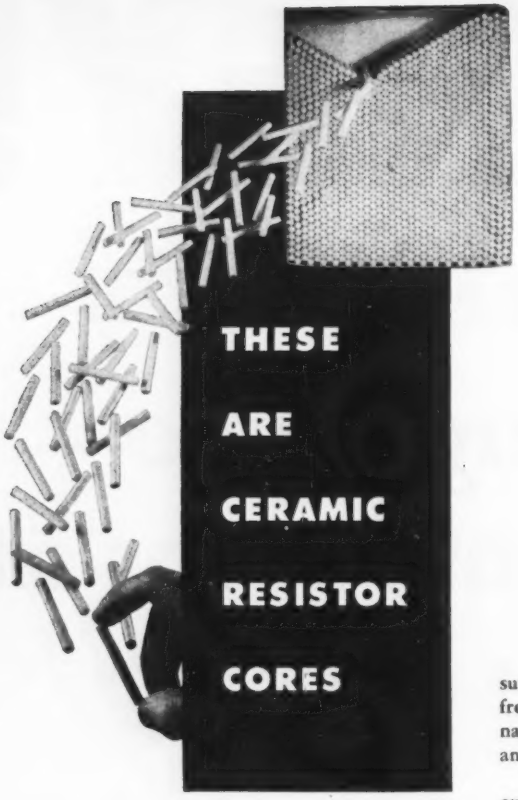
buy high-quality Westinghouse fluorescent lamps at NEW LOW NET PRICES

on quantity purchase

YOU CAN BE SURE... IF IT'S

Westinghouse

CITY	ADDRESS	PHONE
Los Angeles	600 St. Paul Ave.	Madison 6-3881
Louisville	332 W. Broadway	Clay 8993
Memphis	130 Madison Ave.	8-8546
Milwaukee	538 N. Broadway	Daly 8-1800
Minneapolis	727 2nd Ave., N.	Main 1471
Nashville	2908 Woodlawn Dr	9-9560
New Haven	42 Church St.	5-3191
New Orleans	238 So. Saratoga St.	Tulane 8891
New York	40 Wall St.	Whitehall 3-4321
Newark	528 Ferry St.	Mitchell 2-3450
Oklahoma City	120 N. Robinson St.	7-1633
Omaha	117 N. 13th St.	Harney 8-700
Peoria	114 Callendar St.	8-533
Philadelphia	3001 Walnut St.	Evergreen 2-1200
Pittsburgh	337 Blvd. of Allies	Atlantic 1-8400
Pittsburgh	McKee & Leonard Sts.	Federal 1-9962
Portland, Ore.	309 S. W. 6th Ave.	Atwater 9464
Providence	51 Empire St.	Gaspee 1-0818
Richmond	1110 E. Main St.	2-4758
Roanoke	Kirk Ave. & 1st St.	6263
Rochester	1048 University Ave.	Monroe 1635
Sacramento	1720 14th St.	Gilbert 3-6525
Saginaw	124 S. Jefferson St.	Saginaw 4-2640
St. Louis	411 N. 7th St.	Central 1120
Salt Lake City	235 W. South Temple St.	5-3413
San Antonio	115 W. Travis St.	Garfield 5114
San Diego	861 6th Ave.	Main 8151
San Francisco	410 Bush St.	Exbrook 2-5353
Seattle	1200 Westlake Ave., N.	Garfield 2133
Spokane	1023 W. Riverside Ave.	Main 3294
Springfield	26 Vernon St.	6-8373
Syracuse	700 W. Genesee St.	2-1361
Tampa	405 Wallace S. Bldg.	2-8208
Tulsa	600 S. Main St.	3-3191
Washington, D. C.	1625 "K" St., N. W.	National 8843
Wichita	301 S. Market St.	5-2631
Wilkes-Barre	267 N. Pennsylvania Ave.	3-1144



They are coated by the deposition of gaseous carbon; after coating, a spiral groove cut through the surface of the "rod" lengthens the current path to provide required value of resistance.

They appear to be simple pieces, and they are produced by Lapp in the millions, at a very few cents each. Yet as a development and production accomplishment, their simpleness is a deception indeed. Physically and electrically they are something quite "special" as a ceramic achievement.

Dimensionally, they admit a tolerance of only ±.005″ in diameter, ±.010″ in length. Ends are square, accurately beveled. Rods are ruler-straight, and roundness is maintained within .001″. The nature of the surface is critically important, too. It must be wholly free of pits, striae, ridges or other blemishes, and of a nature that will "take" the carbon coating smoothly and in uniform thickness.

In addition, a paramount consideration in this extremely fine type of resistor is *constant resistance* against temperature change and time—within a far narrower range than is possible with regular electrical porcelain or steatite. This requirement has been met by development of a special alkaline earth fluxed porcelain body. Production of this body is a delicate matter; the critical firing range, for example, is only one-fifth that of porcelain insulators.

Lapp is proud of its ability to develop and produce a special component to such demanding specifications. But our real pride is in the ceramic ingenuity, and in the ceramic control techniques that make such accomplishments possible. These are the factors, we are sure you will agree, that add permanent value and quality, to the end of superior performance, to every Lapp insulator and to every piece of Lapp porcelain for any electrical duty.

Lapp Insulator Co., Le Roy, N. Y.

Lapp

NEWS ABOUT PEOPLE

E. M. Graham, Jr, Made VP of Bangor Company

Edward M. Graham, Jr, has been elected a vice president of Bangor (Maine) Hydro-Electric Co. He has been assistant to the president.

Graham, son of the company's

E. M. GRAHAM, JR.

president and a grandson of the late John R. Graham, also a president of the utility, joined Bangor Hydro-Electric in 1940 and served in various departments.

During World War II Graham served as a captain in the Air Force for four years. He returned to the Bangor company in 1946 and became divisional manager at Lincoln in 1947. Three years later he was made assistant to the president.

•

Edgar C. Dehne has been elected assistant treasurer and assistant secretary of Westinghouse Electric Corp. He replaces **Edward George, Jr,** who is retiring. Dehne, eastern district treasury manager of the company at New York for the past two years, will make his headquarters in Pittsburgh. He joined Westinghouse in 1942 and previously worked for the National Bank & Trust Co of Connelsville, Pa., and other banks.

W. Clifford Mumford, acting manager of Worthington Pump & Machinery Corp's Vertical Turbine Pump Sales Division, has been named manager of the division. **Fenmore E. Dunn,** consulting sales engineer, has been appointed assistant manager of the Vertical Turbine Pump Division.

A. V. Hughes has been appointed director of engineering and research for Kuhlman Electric Co, Bay City, Mich. Before joining Kuhlman Electric he spent a year and a half with Battelle Memorial Institute as research engineer in the electrical engineering division. Hughes also worked as a transformer development engineer with Westinghouse Electric Corp.

George J. Huber, Jr, has been named manager of the Philo plant of Ohio Power Co. Formerly assistant manager of the plant, Huber replaces **Weston A. Brown** who has been named plant consultant for American Gas & Electric Service Corp. Succeeding Huber as assistant manager at the Philo plant is **Edward L. Seidler,** assistant manager of the Windsor station of Beech Bottom Power Co, W. Va., subsidiary of Ohio Power. **H. E. Crouse,** superintendent of operation at the Windsor station, has been promoted to assistant manager.

Herbert E. Mundt, chief structural designer, has been named head of the plant engineering department of Wisconsin Electric Power Co. **Edward E. Bolzendahl** and **William H. Edwards** have been named his assistants. Mundt joined the utility in 1922 as a structural engineer.

John A. Paul, commercial sales representative of Ohio Power Co at East Liverpool has been named commercial sales supervisor of the utility's eastern division with headquarters at Steubenville. **Fred C. Jackson** was named to succeed Paul in East Liverpool.

E. Harry Luther, assistant to the division manager at Kalamazoo, Mich., for Consumers Power Co, has been appointed general training and educational supervisor of the company.

Wickstrum Is Appointed Sylvania VP, Sales Head

Barton K. Wickstrum has been elected vice president and director of sales of Sylvania Electric Products, Inc. Charles A. Burton has been named to succed him as general sales manager of the Lighting Division.

Wickstrum joined Sylvania in 1939

B. K. WICKSTRUM

as divisional sales promotion and advertising manager and became Pacific Coast sales manager in 1944 and Midwestern sales manager of the Lighting Division in 1945. He was made general sales manager of the division in 1946. Wickstrum has his headquarters in New York.

Burton, whose office is located in Salem, Mass., started with Sylvania in 1938 as a salesman in the Milwaukee and Minneapolis areas. He became Central Division sales manager of the Lighting Division in 1942, divisional assistant general sales manager in 1947, and lamp sales manager in 1949.

•

Laydon Lansing, district manager at Schenectady since 1948 for Niagara Mohawk Power Corp, has been named manager of the Utica district. **Osborne B. Nye,** manager at Glens Falls since 1947, is the new manager at Schenectady. Replacing Nye at Glens Falls is **George L. Johnson,** who has been commercial manager of the Albany district. **John V. Lasher** has been ap-

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BIG, YES... and with plenty of room to GROW!

THIS DISPATCHER has his power system in the room with him on this illuminated system map. "Live" illuminated symbols show him the status of his equipment at all times. So large it had to be photographed in sections, the map identifies major power sections of a Gulf Coast utility. The entire series of units was built to fit efficiently into the space requirements of the Dispatcher's office.

OUR LARGEST YET!

Total Length—23 Feet
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Total Number of Symbols—815
Size of Symbols—1¼ Inches
Space for Future Expansion—*Plenty*

LET US KNOW YOUR operational requirements and space limitations. We will custom build equipment to do the job you want done—in the way you want it done. *Write* for Bulletin AA-2 which explains "SUPER-TROL"—Control Corporation's System of Supervisory Control.

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pointed manager of the Hudson district. He has served as manager at Canajoharie since 1944.

Theodore E. Traugott has been appointed regional manager for Locke Department of General Electric Co at San Francisco. He has been district manager at Minneapolis for the last four years. **Edwin J. Moore** of the Kansas City office has taken over Traugott's position in Minneapolis. Replacing Moore in Kansas City is **James G. Tuley.**

L. L. Peterson, Clinton manager for Interstate Power Co, Dubuque, Iowa, has been transferred to the Dubuque office as executive assistant. He has been replaced at Clinton by **J. C. Wolfe.** Peterson has been with Interstate for 23 years and served as manager at Clinton since 1937. Wolfe joined Interstate in 1930 and for the past four years has been special representative in the Dubuque office.

•

Westinghouse Advances H. G. Cheney, 2 Others

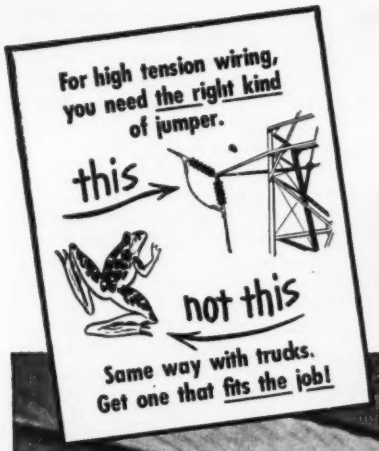
Harold G. Cheney has been appointed sales manager for Westinghouse Electric Corp's Electronic Tube Division. He has been administrator of lamp sales since early this year.

In other appointments Westinghouse named Richard S. Sheetz materials allocation coordinator for the Lamp Division and Hendley Blackmon manager of engineering association activities.

Cheney joined Westinghouse in 1920 as an accountant in the lamp engineering department and later transferred to the advertising and sales promotion department. He became a member of the executive sales staff in 1930.

With Westinghouse since 1946, Sheetz has had varied experience in the Electronic Tube Division, research, commercial engineering, and the lamp sales department. He was appointed staff assistant to the purchasing agent of the Lamp Division this year.

Blackmon, formerly assistant manager of engineering association activities, succeeds Frank Thornton, Jr, retired, as manager. He began working for the company in 1925 and served in the switchboard engineering and the general engineering departments. In 1932 he became technical editor of the Technical Press Bureau and in



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Are high hauling costs affecting *your* utility profits? If so, you need trucks that fit your job. You need Dodge *"Job-Rated"* trucks!

Your Dodge trucks will be *"Job-Rated"* throughout—packed with many, many improvements. Take the Dodge Power-Wagon, for example. Its hefty, husky 94-h.p. engine gives you the kind of rugged power you need for your job . . . with plenty of "get-up-and-go" on or off the highway.

Like *any* Dodge truck it will give you penny-pinchin' economy—with low gas and oil consumption and lower upkeep costs! What's more, you can be sure your Dodge *"Job-Rated"* truck will give you safe, *dependable service* for years and years!

Your nearby Dodge dealer will be happy to give you the facts on how you can haul *more* . . . in *less* time . . . at *lower* cost with Dodge *"Job-Rated"* trucks! Drop in and see him soon.

How a Dodge truck is *"Job-Rated"* for utility operations

A Dodge *"Job-Rated"* truck is engineered *at the factory* to fit a specific job . . . save you money . . . last longer.

Every unit from engine to rear axle is *"Job-Rated"*—factory-engineered to haul a specific load over the roads you travel and at the speeds you require.

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Every unit that MOVES the load—engine, clutch, transmission, propeller shaft, rear axle, and others—is engineered right to meet a particular operating condition.

"Job-Rated" TRUCKS DO THE MOST FOR YOU

for Help when you need it
-or before-call

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Check the ways in which Commonwealth can contribute to the efficiency and economy of your organization. Write for booklet describing the many services available to you. Address: Commonwealth Services Inc., Department A4, 20 Pine Street, New York 5, N.Y.

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ABILITY · EXPERIENCE · RESOURCEFULNESS · RESULTS

1933 manager of the bureau. Blackmon left Westinghouse in 1945 to join McGraw-Hill Publishing Co as electrical editor of "Product Engineering." He later served as managing editor of "Electrical World." He returned to Westinghouse in 1949.

•

Harold J. Clauson, assistant secretary-treasurer of Pembroke Electric Light Co, Ontario, has been appointed secretary-treasurer of the utility. He succeeds **Cyril J. Webb** who resigned his position as managing director and secretary-treasurer to join Nova Scotia Light & Power Co as assistant treasurer.

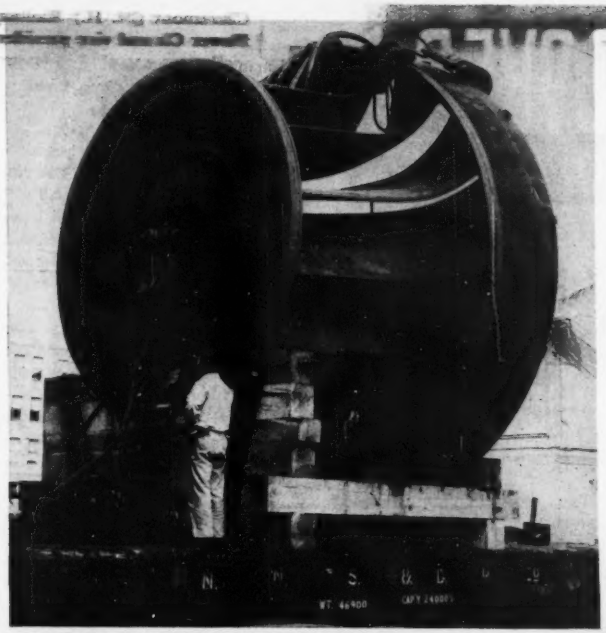
Ward Storrar, local manager at the Snoqualmie, Wash., office of Puget Sound Power & Light Co, has been appointed assistant superintendent at the Snoqualmie Falls power plant replacing **Joe Martin,** who has resigned. **John McLean** succeeds Storrar as Snoqualmie manager.

Leonard G. Walker has resigned as electrical engineer with Idaho Power Co to accept a position as assistant chief engineer in the communication and electronics division of Motorola, Inc, Chicago.

Philip A. Stang has retired as Johnstown district manager for Pennsylvania Electric Co after 32 years of service with Penelec and its predecessors. He began his utility career in 1919 with Metropolitan Edison Co and served as valuation engineer, superintendent, and manager. In 1933 he went to Easton, Pa., as manager for W. S. Barstow & Co and remained there as district manager for the Utility Management Corp and manager of the electrical division of Metropolitan Edison until 1929. In that year he became president and manager of Keystone Public Service Co, Oil City, Pa. Keystone was absorbed by Penelec in 1943.

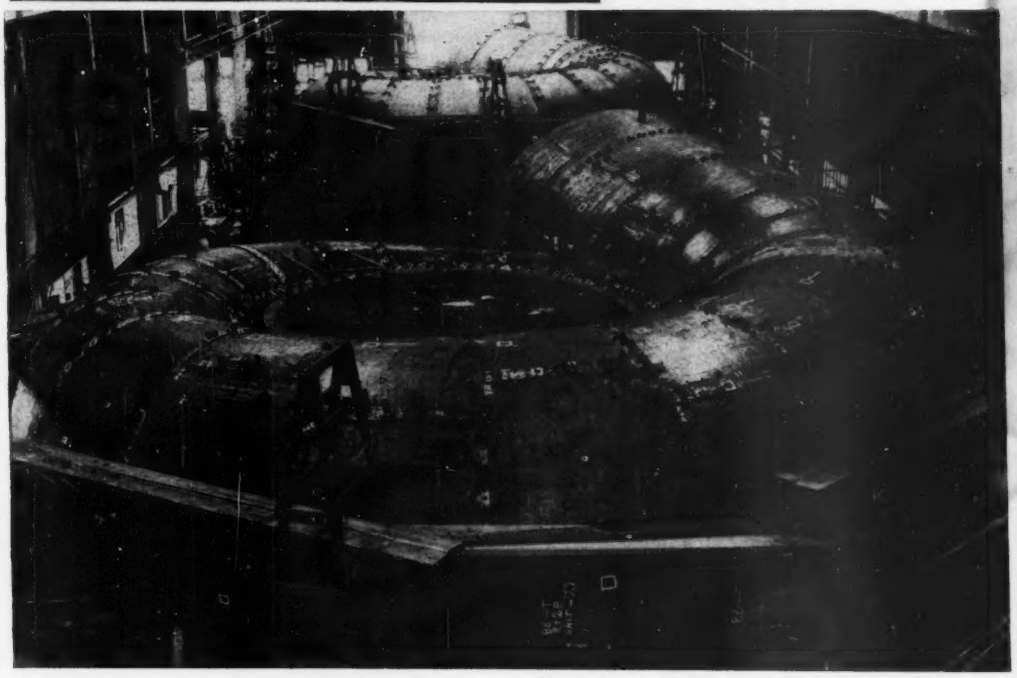
Charles W. Duff has been appointed engineer in charge of the Port Washington plant of Wisconsin Electric Power Co. He succeeds **Harry Shaver** who has retired.

J. Gardner Menut, valuation engineer in the office of the Army Chief of Engineers, has retired after 17 years of government service. Before joining the corps he served as manager of the



OVER EIGHT MILLION HORSEPOWER

The Newport News Shipbuilding and Dry Dock Company has received orders for the building of hydraulic turbines aggregating output of 8,150,000 horsepower.



NEWPORT NEWS
SHIPBUILDING AND DRY DOCK COMPANY
Newport News, Virginia

YORK-HOOVER

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new LIGHT DUTY SERVICE INSTALLATION BODY

WHAT THE MODEL 201U76 BODY WILL DO FOR YOU...

Light duty service work must be fast and efficient. Materials and tools must be readily accessible. That is why the new York-Hoover Model 201U76 Body was designed . . . especially for **your** light duty service work . . . for **your** convenience . . . for **quicker, better service.** Efficient design and sturdy construction, combine to provide this **faster, better service** for you . . . at **less** cost.

Write us today regarding your light duty service problems. We will be glad to provide you with all the details, including earliest possible delivery dates of the Model 201U76.

Bulletin No. 930 contains all the facts about our Model 201U76 Body. Write for your copy today!

York-Hoover Corporation
YORK, PENNSYLVANIA
Body Division

Claremont (N. H.) Railway Light & Power Co and vice president and general manager of the Vermont Hydro-Electric Co and the Rutland Railway Light & Power Co.

Thaddeus L. Sharkey, former assistant rate engineer for Potomac Electric Power Co, has joined the staff of Ebasco Services, Inc, as a rate consultant. He began his utility career with Washington Railway & Electric Co in 1931, parent company of Potomac Electric at that time.

Clarence H. Osha has been named assistant manager of the Fort Wayne Division of Indiana & Michigan Electric Co. He had been commercial manager. Osha joined Indiana Service Corp, predecessor firm, in 1941 and previously served as a power sales engineer with Wisconsin Electric Power Co.

Norman G. Hardy, superintendent of power for Texas Power & Light Co, has retired after 29 years' service. He joined the company in 1922 as an engineer at the Waco plant and was transferred a year later to the general office in Dallas as production engineer. He became superintendent of power in 1930.

V. de P. Gerbereux has been appointed manager of the Centrifugal Pump Sales Division of Worthington Pump & Machinery Corp. He had been assistant manager of the division since 1937. Joining Worthington in 1924, Gerbereux first served as a centrifugal pump designer and then as an application engineer.

Stuart V. Willson, manager of the Faribault, Minn., division of Northern States Power Co, has been named executive assistant of the Wisconsin division of the company at Eau Claire. Succeeding him as manager of the Faribault division is **Whitman Rork,** who has been sales manager of the division.

V. K. Sirbaugh has been appointed sales supervisor for the Winchester district of Northern Virginia Power Co. He has been with the utility as a salesman since 1941.

C. J. Carothers, supervisor of fluorescent tubing for Sylvania Electric Products, Inc, has been given the additional duties of merchandising super-

From Switchboard Wires to Power Cables... *specify* U. S. RUBBER

A typical example of "U. S." leadership is Laytex-Neoprene Supervisory Control Cables. In its 19 years of manufacture, not once has a failure of this cable ever been reported. The insulation resistance of these cables actually improves in wet locations!

The small diameter of the Laytex® insulation makes unnecessary the enlargement of cable ducts where signal service is expanding. The Neoprene jacket provides high resistance to abrasion and other abuse, and is highly resistant to oil, flame, and sunlight. The cables are light in weight, easy to install. United States Rubber Company, Electrical Wire and Cable Department, Rockefeller Center, New York 20, N. Y.

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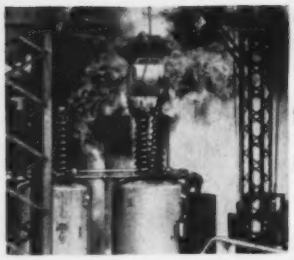
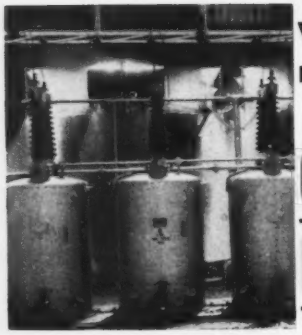
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY



PROTECTING
flammable, oil-filled
TRANSFORMERS
with time-tested, rapid extinguishing
GRINNELL MULSIFYRE



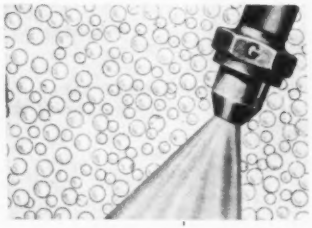
In case after case, where Grinnell MULSIFYRE has been on guard, hazardous oil fires have been effectively controlled — damage limited. For example . . .

● On August 2, 1944, a fault occurred on the 26 KV ring bus at a substation of the Public Service Electric & Gas Co., Harrison, New Jersey. Following the tripout, the operator noticed the end bay, where the transformer was located, to be ablaze. He immediately activated the electrical control operating the Grinnell MULSIFYRE System, deluging the transformer banks with water spray and extinguishing the fire.

● At a substation of the Omaha Publice Power District, Omaha, Nebraska, two 25-year-old three phase 6250 KVA 13.2-2.3 KV water-cooled indoor type transformers were protected by a MULSIFYRE System automatically actuated by Quartzoid Pilot Sprinklers. On August 30, 1944 a minor explosion occurred, setting the transformer afire. The Grinnell MULSIFYRE System went into operation immediately, and there was no fire damage.

● In 1948, a lightly built wooden sawing shed was erected by the Singer Manufacturing Company, Bridgeport, Connecticut, adjacent to a bank of three 500 KVA transformers. A fire started in the shed, apparently when a carelessly discarded cigarette or match ignited sawdust, and quickly burned through the roof. The MULSIFYRE System operated over the exposed transformers, preventing damage to them.

Stop future trouble and expense. Get complete facts *now* on reliable Grinnell emulsion-forming spray systems. Write Grinnell Company, Inc., Providence, R. I. Branch offices in principal cities.



GRINNELL *Mulsifyre*

EMULSION-EXTINGUISHMENT OF OIL FIRES

visor of wiring devices. Prior to joining Sylvania in 1948, Carothers was general sales manager of Colorescent Laboratories, Inc, Elizabeth, N. J.

William A. Mallory has been named manager of the mechanical connectors department of National Electric Products Corp, Pittsburgh. With the company since 1925, Mallory most recently has done work in servicing engineering and layout of the company's electrical systems.

Sidney Withington, chief electrical engineer of the New York, New Haven & Hartford Railroad, has retired. He had been with the railroad since the beginning of its electrification and was engineering assistant to the vice president at the time of his retirement.

Truman Price has been named senior engineer of the Pacific County (Wash.) PUD. The PUD commissioners also appointed **William Fell** superintendent of the Ilwaco operations of the district.

A. O. Wilson, manager and chief engineer of Hetch Hetchy Supply, Power, and Utilities Engineering Bureau, San Francisco, will retire in December. He has been chief engineer of the bureau since 1945 and previously was manager and chief engineer of the Bureau of Light, Heat, and Power in charge of street lighting and all other municipal uses of electricity, gas, and steam.

J. B. Whitmore has been appointed Roanoke (Va.) division commercial manager of Applachian Electric Power Co. **E. L. Munday, Jr,** succeeds him as Roanoke district commercial manager. Replacing Munday as rural and residential sales supervisory is **L. A. Fulcher.**

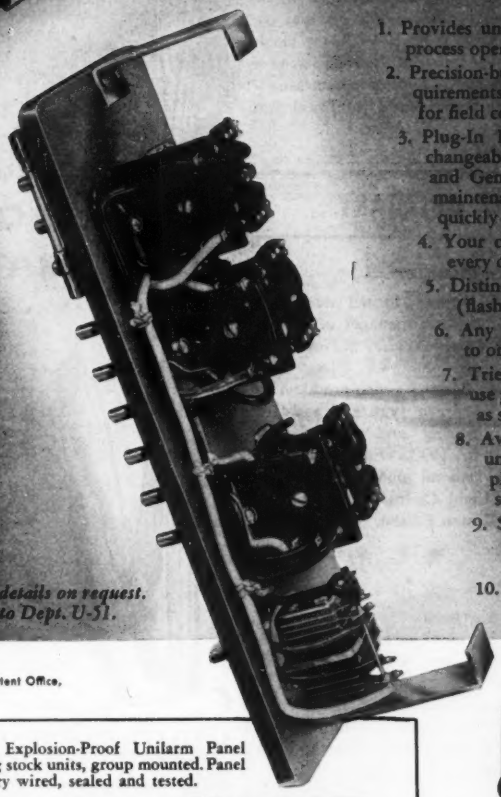
K. Charles Bean, has retired as chief engineer and general manager of the Los Angeles City Board of Public Utilities and Transportation, a position he has held for 15 years.

Newton Hall Barnette has succeeded **William B. Stelzner** as head of the electrical engineering department of the University of Arkansas' College of Engineering. He has been an associate professor of electric engineering at the university since 1948.

John Flessner, an early pioneer in farm electrification work, has retired

No Other Alarm System Has ALL The Advantages Of

R&S UNILARM*...



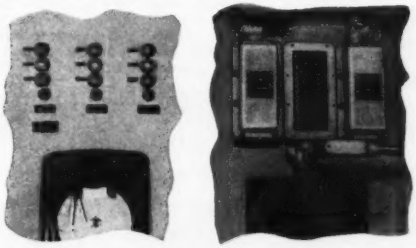
1. Provides unfailing supervision of equipment and process operations.
2. Precision-built to Underwriters' Laboratories requirements. Completely wired and tested . . . ready for field connections.
3. Plug-In Panel (large illustration), fits interchangeably into Explosion-Proof, Vaportight and General Purpose enclosed units. Reduces maintenance to a minimum . . . easily and quickly replaced with a spare unit.
4. Your choice of 100 standard circuits to suit every conceivable application.
5. Distinctive visual signal for each condition (flashing light) insures immediate attention.
6. Any number of Unilarms may be connected to one audible signal.
7. Tried and tested in the field. Thousands in use giving trouble-free protection. Accepted as standard by leading industries.
8. Available as individual unit or in multi-unit Panels. Also time delay types for applications subject to high surge or excessive vibration.
9. Saves space, engineering costs, installation and maintenance over other alarm systems.
10. Acknowledgement-test switch permits periodic testing of each Unilarm circuit.

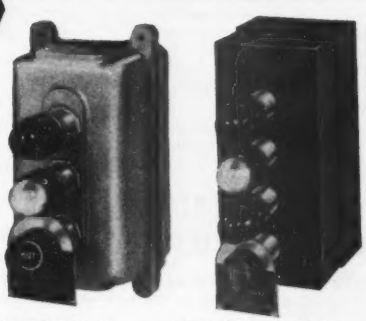
Complete details on request. Write to Dept. U-51.

*Reg. U.S. Patent Office.

D1

Special Explosion-Proof Unilarm Panel showing stock units, group mounted. Panel is factory wired, sealed and tested.





Vaportight Unilarm *General Purpose Unilarm*

R&S Unilarm is also available in a complete line of Surface Mounted Types — Explosion-Proof, Vaportight and General Purpose.

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Since 1909, the job of The Electric Products Company has been to create and develop special electrical rotating equipment . . . motors and generators to do existing jobs better or to reach into new fields to do jobs that couldn't be done before. The natural "by-product" of our more than 40 years of specialization is that you get equipment designed and built to the exact requirements of your application . . . equipment that has greater dependability, longer life and that requires less maintenance.

Send in the coupon below for detailed information about our Custom-Engineered synchronous motors and generators . . . d-c motors and generators . . . induction motors . . . battery chargers . . . frequency changers.

A nation-wide sales engineering and service organization stands ready to meet all User requirements.

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CLEVELAND 12, OHIO

Attach coupon to your letterhead for your copy of Bulletin 2-200.

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X-71

from Detroit Edison Co. He served as the company's first farm advisor and has done experimental work in developing new uses for electricity on the farm.

Russell J. Wolf has been named vice president in charge of sales and **Donald W. Champlin,** vice president in charge of manufacturing of M. V. Kellogg Co, New York. Wolf formerly served as assistant to the president of the firm and Champlin as general manager of the Equipment Manufacturing Division of Continental Can Co.

OBITUARY

Sidney Hosmer

Sidney Hosmer, former vice president and general manager of Boston Edison Co, died Aug. 27 at New York City.

Hosmer became a vice president of Boston Edison in 1926 and assistant general manager and then general manager in 1932. Earlier he had served as general manager of Boston Electric Light Co before its acquisition by Boston Edison. He retired in 1938.

•

Hervey S. Vassar, 73, retired head of Public Service Electric & Gas Co's testing laboratory, died at Bloomfield Aug. 30. Vassar joined the utility's predecessor company, Public Service Corp of New Jersey, in 1903 and became head of the testing laboratory in 1911. He retired in 1947.

Walter H. Patterson, 62, chief engineer of the storage battery division of Thomas A. Edison, Inc, West Orange, N. J., died Aug. 21 at Glen Ridge, N. J. He joined the Edison company shortly after his discharge from the Army after World War I. Previously Patterson had worked for Westinghouse Electric Corp's Lamp Division.

George H. Miller, 51, operating engineer for the Los Angeles Bureau of Power & Light, died Aug. 15 at Palos Verdes, Calif.

Carl A. Sylvester, 72, retired vice president of Brazilian Traction Light & Power died at Damariscotta, Maine, Aug. 24.

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IMPROVES
OPERATION

• Care and skill in tree trimming operation are extremely important. They can build good will rather than injure it—and certainly improve operation. Clear lines for 1952 may be insured with the least trouble if trimming is done in the near future. As a supplement to your own crews, there are a number of firms that make a business of tree trimming for power companies; many of them use Bartlett Tree Trimming Equipment and consider these tools efficient and, above all else, SAFE. If your crews are not equipped with Bartlett Tools write for particulars.

BARTLETT COMPOUND LEVER
INSULATED TREE TRIMMER

Bakelite Insulator-tested to 105,000 volts. Compound Lever Head, cuts 1¼ in. branches easily. High grade materials—a first class, lasting tool, made with one piece pole or with sectional pole as you wish, 6 to 16 feet. Laminated sitka spruce.

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18", 22", 24" or 26" blade, draw cut, large hand hole horn or "D" type handle

Also Pole Saws, Hand Pruning Saws, Two Hand Pruners, Tree Paint, Lag Thread Tree Rod, etc.

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These Points are Basic Factors:

- HIGH SPEED
- POSITIVE INTERRUPTION UNDER ALL CONDITIONS
- RAPID RECLOSING
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OUTDOOR BREAKERS — 69 TO 230 kV

OUTDOOR CUBICLES — 14.4 TO 46 kV

YOU CAN'T BEAT A BROWN BOVERI AIR BLAST BREAKER FOR ALL THESE BASIC FACTORS—*and MORE!*

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Please send me specifications and details on your
☐ indoor ☐ outdoor air blast breakers for
____kV ____Amps. ____kVA.

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MANUFACTURERS and MARKETS

GE, Westinghouse Plan to Cut Appliance Output

Both General Electric Co and Westinghouse Electric Corp are planning large cuts in fourth-quarter production of appliances.

GE plans to cut its refrigerator output 50% of the first-quarter level. Westinghouse's production of large and small electrical appliances in September will be 40% less than the number of units produced in September, 1950, the company has disclosed.

The two companies have cited government restrictions on steel, copper, and other critical materials as the reason for the cutbacks.

A Westinghouse official commented that if materials allocations for the fourth quarter were less than the company is currently permitted, production of appliances would have to be curtailed still further. He predicted several Westinghouse major appliances will be in short supply in the fourth quarter. Among these are washers, clothes driers, roasters, and food mixers.

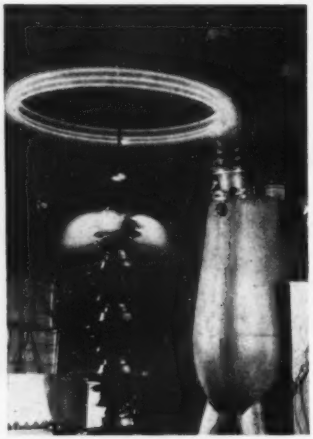
General Electric so far has not suspended or reduced output of small appliances, but it is expected that materials shortages will force the company to cut production or eliminate some items soon. Materials shortages have forced gradual reduction in refrigerator production since the end of the second quarter.

•

Jamaica Bauxite Fields Being Developed by Kaiser

Kaiser Aluminum & Chemical Corp has started construction at its Jamaica, British West Indies, bauxite deposits to raise present aluminum ore sources by one million tons a year.

The company has purchased or optioned 11,000 acres of bauxite properties on Jamaica. The proximity of these reserves to the firm's Baton Rouge, La., alumina plant will cut the shipping distance by more than half compared to present sources. The first quantity shipments are scheduled to begin in September, 1952.



PINWHEEL EFFECT was created at Westinghouse Electric Corp's Trafford, Pa., laboratory when engineers were demonstrating the phenomenon of corona, which is the leakage of power at high voltages

The estimated cost of the program is $14.5 million.

Facilities to be built on the island include a railroad, processing buildings, and a deep-water dock.

•

Buys Lighting Company

Duro-Test Corp, North Bergen, N. J., manufacturer of incandescent lamps, fluorescent lamps, and fixtures has purchased Color Lighting Corp, New York. Color Lighting, which manufacturers Rollo-Color lighting products, will be operated as a wholly-owned subsidiary. Terms of the sale include all the company's patents and patent applications, plant, machinery, raw materials, and finished inventory.

Metal Prices
Sept. 4, 1951

COPPER, Conn., V., lb	$ .24½
LEAD, N. Y., lb	.17
ZINC, prime Western, E. St. Louis, lb	.17½
TIN, Straits, qual. N. Y., lb	1.03
ALUMINUM, ingot, base price	.19
NICKEL, base price	.56½
STEEL, billets, Pitts., ton	56.00
STEEL, scrap, No. 1 heavy, Pitts., ton	45.00

Mica Insulation Firm Is Formed in Delaware

Samica Corp, recently established in Delaware, expects to start production of high grade mica electrical insulation from domestic scrap or small Muscovite Mica. At present nearly all of the mica used by the electrical and other industries in this country is imported from India and Madagascar and is processed by hand labor.

The new company will use a French process. It is based on experiments by the late Jacques Bardet in 1939 and was first used on a laboratory scale in 1943. The process is being used for commercial production at a factory in Valdoie, France.

Hand labor is almost entirely eliminated by the new process in which chemical and heat treatment reduces the raw mica to a pulp that is then formed into continuous thin, coherent sheets by an adaptation of conventional paper-making techniques. Up until now it has been impossible to exploit most of the mica deposits in the Western Hemisphere because of the cost of labor necessary to change it into usable form.

Participants in Samica Corp are Mica Insulator Co, Schenectady, N. Y.; Prosilis, S. A., Paris, France; and Swiss Insulating Works, Breitenbach, Switzerland. M. A. Chapman, president of Mica Insulator, is chief officer of Samica.

•

General Electric Pay Plan Gets a Mixed Reception

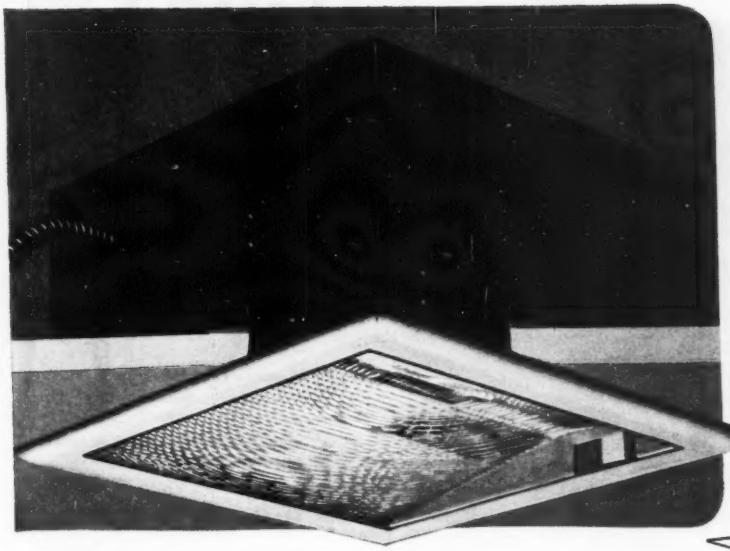
General Electric Co's offer to increase wages 2½% and to grant cost-of-living raises has received a mixed reception.

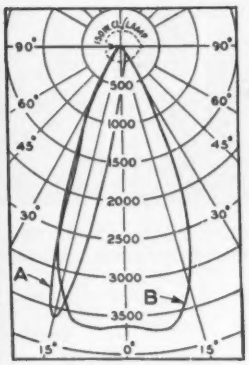
The International Union of Electrical Workers, CIO, has stated that with certain modifications the union might accept the company's offer. The rival United Electrical, Radio, and Machine Workers Of America, independent, has blasted the offer, however, as "trifling" in view of GE profits. IUE represents 70,000 GE workers and UE 50,000 workers.

Another Important Advance in Lighting Technique

NEW HOLOPHANE VERTICAL SURFACE LIGHTING

Featuring CONTROLENS* *with Concave Cross Section*

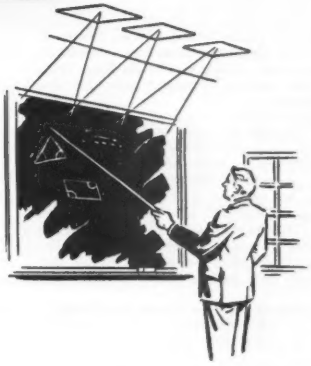




"A"—Vertical Distribution in Plane of Offset
"B"—Lateral Distribution in Plane of Maximum Candlepower

Precision Illumination for
Control Boards • Gage Boards • Bulletin Boards
Displays • Murals • Paintings • Chalk Boards

Holophane does it again . . . with new and revolutionary units that perform at least twice as effectively as anything previously known . . . Unprecedented in design, they provide an altogether different prismatic pattern because they feature a new CONTROLENS with concave cross section. This CONTROLENS directs a major portion of the lamp output to the vertical surface, with only a minimum of brightness toward the observer. The result: highest degree of discernability with maximum visual comfort.



For engineering details, specifications, installation and spacing information as well as tables determining initial illumination on vertical surfaces, write for DS-34, No. 798 folder.

Holophane

*Reg. U. S. Pat. Off.

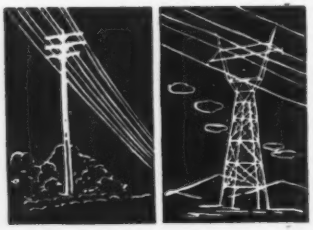
HOLOPHANE COMPANY, INC.

Lighting Authorities Since 1898 · 342 MADISON AVENUE, NEW YORK 17, N. Y.

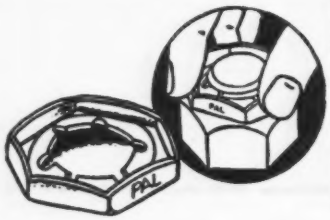
THE HOLOPHANE COMPANY, LTD., THE QUEENSWAY, TORONTO 14, ONTARIO

ELIMINATE RE-TIGHTENING OF NUTS

On Steel Tower and Wood Pole Lines



Specify PALNUTS on new lines
Add PALNUTS to existing lines



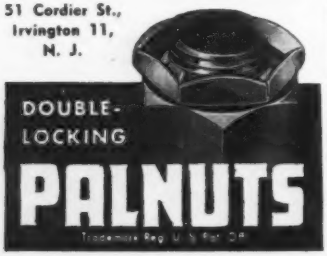
For over 12 years, Double Locking PALNUTS have been keeping bolt-and-nut assemblies tight on steel towers, wood pole lines, cross arms and braces, insulator pins, clevises and clamps.

When applied on new installations, PALNUTS save future checkups and re-tightening. Maintenance crews checking old installations can add PALNUTS without disturbing regular nut. Only 3 bolt threads space are required. PALNUTS are very low in cost, may be removed and reused. They are available in a full range of sizes, in Hot Dipped Galvanized or other finishes and materials used by the Utility industry.

SEND details of your needs for samples. Write for PALNUT literature and detailed folder on power line applications.

THE PALNUT COMPANY

51 Cordier St., Irvington 11, N. J.



IUE seeks an adjustment in the 2½% across-the-board increase which would make the minimum raise 4¢ an hour. A GE official has called this demand "unwarranted." The CIO union also has stated that contract clauses under discussion on vacations, pensions, and job security must be acceptable before it will sign a contract. The contract between IUE and GE runs out Sept. 15.

MANUFACTURING BRIEFS

Bids from foreign firms on city business at Seattle, Wash., will be "considered and evaluated strictly upon their merits," the city purchasing agent has declared in his annual report. He referred to the foreign-bid controversy which aroused interest last year. Two British firms submitted the lowest figures received by the city on transformers for a City Light Project but lost out on the contract because they failed to meet specifications.

Westinghouse Electric Corp employees have set a new safety record in the company. During the first six months of 1951 the accident frequency rate decreased 3%. This compares with an 8% increase for industry in general during the same period.

Aluminum Co of America has started an expansion program at its Aluminum Research Laboratories at New Kensington, Pa. Total floor space at the laboratories will be increased by one-third. The new addition will be ready for occupancy in the early part of next year.

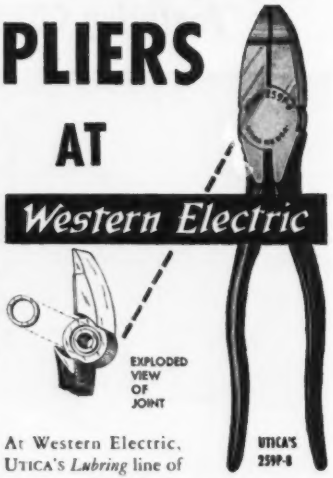
"Employer of the Year" citation has been awarded P. R. Mallory & Co, Indianapolis, by the Blinded Veterans Association.

SALES ASSIGNMENTS

COMPANY STAFFS

Joslyn Manufacturing & Supply Co, Chicago, has transferred several of its representatives. Walter Armstrong has moved to Indianapolis to handle the Indiana territory; C. V. Miller is located in Jefferson, Wis., to cover part of Wisconsin and northern Illinois; Don Hamister has been transferred to St. Louis, Mo., and J. R. McGinley is representative in Iowa with headquarters in Cedar Rapids.

UTICA *LUBRING* PLIERS AT *Western Electric*



At Western Electric, UTICA'S *Lubring* line of pliers . . . with built-in lubrication . . . is used for a wide variety of in-plant and field jobs.

UTICA'S *Lubring* line of finest pliers has a ring of oil-impregnated porous iron floating in the joint . . . slowly feeding lubrication for smooth action, long life.

Drop forged, precision machined, with cutting edges hardened by a special UTICA process, the UTICA *Lubring* line has the heft, feel and rugged power for continuous daily use.

DROP FORGED FOR STRENGTH

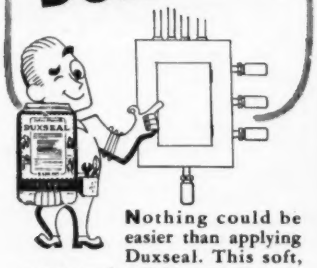
The name UTICA on the pliers and adjustable wrench you use means you're working with the finest in drop forged tools. Drop forging aligns the steel fibre structure with the shape of the tool, as shown in diagram. Drop forging means *extra* strength, *extra* toughness.

UTICA Drop Forge & Tool Corp.
Utica 4, New York
In Canada:
Adam Tool & Supply Co., Ltd., Montreal
Walls-Irons, Ltd., Winnipeg

AND THE WORLD'S BEST TOOLS ARE MADE IN U. S. A.

HANDY ANDY SAYS:

Pluggin's a soft job . . . with Johns-Manville DUXSEAL



Nothing could be easier than applying Duxseal. This soft, permanently pliable plastic putty goes right into place in openings around service boxes, cable entrances, conduit ends, drill holes in foundations . . . makes a smooth, finished-looking job in a matter of seconds. Every electrician should keep a convenient, handy package of Duxseal in his tool box for on-the-spot use . . .

Remains soft—Duxseal stays soft indefinitely, but will not slump, melt or run under ordinary temperatures.

Remains tight—Clings to duct walls and cables but gives with expansion or contraction of the cable.

Remains insoluble—Unaffected by ground waters and gases.

Remains harmless—Will not injure workmen's hands or react with rubber, metals or painted surfaces.

Tight seals for other electrical uses:

J-M Tranolseal . . . for use with electrical equipment using dielectric oils.

J-M Uniseal . . . for caulking against weather and humidity. Resists temperatures up to 180 F.

If you would like to know more about Duxseal and other J-M labor-saving sealing compounds, write Johns-Manville, Box 290, New York 16, N. Y. In Canada, write 199 Bay Street, Toronto, Canada.

JM

Johns-Manville
SEALING COMPOUNDS

for DIGGING HOLES and SETTING POLES in any soil

Whether it's in clay, shale, or frozen ground . . . the Highway Earth Boring Machine is rugged enough to dig holes 9" to 20" in diameter, 7' to 10' deep in any soil except solid rock.

Light enough to mount on a 1½ ton truck, these boring machines need only 6' of platform space. Quickly adjusted to dig at any angle. Include an integral winch and pole derrick that will set 40 to 45 foot poles, weighing 2,000 to 2,500 pounds. Can be mounted on either truck or tractor.

See your Highway representative for full information, or call or write for the complete catalog.

HIGHWAY TRAILER COMPANY

Headquarters: Edgerton, Wisconsin

PLANTS AT EDGERTON, WISCONSIN — STOUGHTON, WISCONSIN
CINCINNATI, OHIO

Manufacturers of Utility Truck Bodies • Earth Boring Machines • Pole and Cable Reel Trailers • Winches • Power Take-offs • Service Accessories

MURRAY
GATES AND
GATE HOISTS
MURCO
DESIGNED AND BUILT TO
MEET ALL REQUIREMENTS
for any Size Power Dam....
From the smallest hand operated, to the large motor operated, MURRAY Gate Hoists are designed and built in a wide range of capacities, from less than 1 ton to over 100 tons. During our over half century of designing and building gate hoists, we have developed many designs for the different types of gate hoist problems. Perhaps we have several designs and patterns that will fit your requirements. In planning gates or gate hoists, we suggest you communicate with us before your plans for the project as a whole, are complete . . . it will save expense and much preparation time. We also build gate hoists especially from your plans and specifications, if desired.
Our Engineering Department is at your service any time, to help you solve problems involving Power Dam Gates and Gate Hoists.
O. J. MURRAY MANUFACTURING CO. WAUSAU, WIS.
Manufacturers Since 1883

The 7-Range
Clip-On
Volt-Ammeter
FERRANTI
Offers These Important Advantages
• Measures up to 1000 amps—up to 600 volts.
• Convenient ONE HAND operation —trigger action.
• Thumb operated range selector switch.
• 7 ranges—5 current and 2 voltage.
• Insulated core—shockproof construction.
• Takes cables up to 2¼" diameter.
• Distinct calibrations—easy to read.
• Suitable for 50-70 cycles.
RANGES: 0-10 amps; 0-25 amps; 0-100 amps; 0-250 amps; 0-1000 amps; 0-150 volts; 0-600 volts.
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NEW ELECTRICAL CONSTRUCTION

NEW ELECTRICAL construction projects announced by private and government utility systems involving more than $70,000. Also listed are major industrial and construction jobs where electrical work is included

UTILITIES

Proposed Construction

Ala., Gantt—Alabama Rural Electric Co-operative, Anadalusia, electric power generating plant. $3,200,000.

Arizona—Bureau Reclamation, Dpt. Interior, Phoenix, Ariz., transformer, lightning arresters, disconnecting switches switch, etc., for Prescott Substation, Davis Dam Proj., Spec. 2008-30. L. N. McClellan, Bldg. 1-A, Denver Federal Center, Denver, Colo., ch. engr.

California—Bureau Reclamation, Dpt. Interior, Sacramento, Calif., constr. 103x323 ft. warehouse for Folsom Power Plant, Central Valley Proj., American River Div., DC 3499. L. N. McClellan, ch. engr.

Calif., Pasadena—City, City Hall furnish, del. erecting generator and appurtenances for light department, LD 51-8.

Colorado—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing and del. f.o.b. cars at shipping point or f.o.b. cars at Campion and Loveland, Colo., transformers, control board, battery chargers, regulator for Flatiron Power and Pumping Plant, Colorado-Big Thompson Proj., Spec. DS 3527. L. N. McClellan, ch. engr.

Colorado—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., supervisory control and telemetering equip for Granby Pumping Plant, Willow Creek Pumping Plant and Willow Creek Dam, Colorado-Big Thompson Proj. Spec. DS-3476. L. N. McClellan, ch. engr.

Ill., Springfield—John H. Hunter, Comm. of Pub. Property, Springfield, power wiring and power piping at Lakeside Power Station. Burns & McDonnell, 95 and Troost Sts., Kansas City, Mo., engrs.

Missouri and Iowa—Atchison-Holt Electric Co-operative, Rock Port, Mo., 70 mi. rural distr. lines, Fremont and Page Counties, Ia., and Atchison, Holt and Nodaway Counties, Mo., $80,000, Henningtton, Durham & Richardson, Standard Oil Bldg., Omaha, Neb., engrs.

North Carolina—Four County Electric Membership Corp., Burgaw, rural distr. lines, in Pender, Sampson, Bladen and Duplin Counties. Plans deposit $10, Southern Engineering Co., 1000 Crescent Ave., Atlanta, Ga., engr.

N. C., Raleigh—North Carolina State College, Raleigh, nuclear reactor bldg., G. M. Small, 615 Hillsboro St., Raleigh, N. C., archt.

Oregon—Bonneville Power Admin., 827 N. E. Oregon St., Portland, constr. Bandon-Port Oxford and Port Orford-Gold Beach 115 kv transmission line, Inv. 6020, Coos and Curry Counties. Plans deposit $25. L. C. Stewart, c/o owner, engr.

Tex., Dallas—Trammel Crow, 3600 Armstrong St., mfg. electronic shop, $260,500.

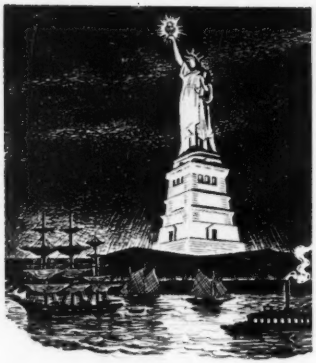
W. Va., Natrium—U. S. Eng., 237 Fourth Ave., Huntington, indoor power center chemical corps STB plant, Eng. 46-022-52-3.

Wyoming—Big Horn Rural Electric Co., Basin, Wyo., 76 mi. rural distr. lines, two rau radio and completion of previously approved construction, Big Horn Co., $370,000. H. S. Nixon Eng. W.O.W. Bldg., Omaha, Nebr., consult, engr.

Wyoming—Bureau Reclamation, Dpt. Interior, Bldg. 1-A, Denver Federal Center, Denver, Colo., furnishing and del. f.o.b. cars at shipping point or f.o.b. cars at Thermopolis, Wyo., transformers for Thermopolis substation, Transmission Div., Missouri River Basin Proj. Spec. DS 3526. L. N. McClellan, ch. engr.

Low Bidders & Contracts Awarded

Arkansas—Lake Charles Electric Co., Lake Charles, La., LB $760,628, complete constr. car house and switchyard for Bull Shoals dam, CIVENG 03-050-52-1, U. S. Eng., 300 Broadway, Little Rock, Ark. Bids Aug. 21.



Light for Miss Liberty

New York Harbor's most famous resident was dedicated on October 28, 1886. The first floodlighting was in 1885 by the use of arc lights. In 1892, as part of the Columbian celebration, more lighting with incandescent lamps was installed.

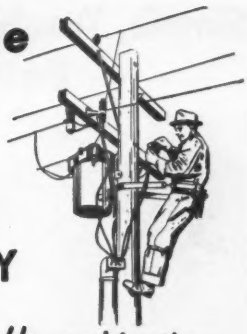
Hemingray's experience in designing and manufacturing pole-line insulators started sixteen years before the dedication of the Statue of Liberty. It was natural, then, that with the coming of electricity that Hemingray should apply its knowledge and experience to the manufacture of electrical insulators.

Continuously since that time, constant research and testing, careful quality control and thorough individual inspection have made the name Hemingray synonymous with leadership and progress in glass insulator manufacture.

HEMINGRAY
POWER INSULATORS
AMERICAN STRUCTURAL PRODUCTS COMPANY
Muncie, Indiana

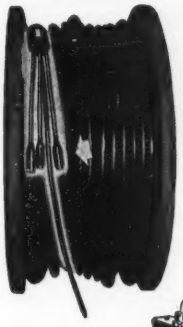
Subsidiary of Owens-Illinois Glass Company

By-pass Trouble



EFFECTIVELY EFFICIENTLY and EASILY

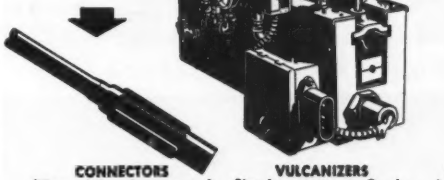
with JOY *Connector-Cable* combinations



When nature or man-made catastrophies disrupt vital power and communication lines, time required to restore normal operations becomes extremely important. One of the most effective ways to minimize this *down-time* is to "Jumper" broken circuits with pre-fabricated JOY Cable-Connector combinations, until permanent repairs can be completed.

Shatter-proof, water-tight and amazingly resistant to wear JOY plugs, sockets and receptacles are available in a variety of sizes and designs that cover standard mechanical and electrical requirements. Factory molded as one-piece molded Neoprene units on 12" to 36" cable leads these plugs are shatter-proof, water-tight and wear-resistant. No special training is required to attach them to cable, and through use of JOY Vulcanizers and Molds even the insulation around the splice becomes an integral part of the cable jacket . . . See cable reel illustration at left.

ABOVE: Cable bushing and end block



CONNECTORS
Water-tight, shatter-proof and jerk-resistant. Available in a wide variety of sizes and styles for standard communication or power transmission needs. Factory molded as integral Neoprene units many are equipped with the famous JOY Water Seal. For complete specifications describe your needs or ask for Bulletin MC-108.

VULCANIZERS
Simple to operate. Can be used for patching cable, rejacketing splices or attaching JOY Connectors. When simple directions *included with each Vulcanizer*, are followed, completed splices are water-tight and wear-resistant. Two designs are available. 1—Steam heated 2—Directly heated . . . Both operate electrically. Bulletin RV-106 describes them in detail. Ask for your free copy now.

MOLDS AND SUPPLIES
Accurately machined in two identical half sections. Hundreds of sizes and many dimensionally correct styles have been developed to cover splicing, patching and pot-heading needs. For detailed information on them as well as JOY vulcanizing Tapes, Cements, and other supplies ask for Bulletin RV-106.

No question about it . . . JOY Connectors attached to rubber or Neoprene jacketed cable with splices insulated and jacketed through the use of JOY Vulcanizers make today's most dependable, electric jumpers. Completely portable and safe they will function perfectly on job after job with a minimum of maintenance attention.

Consult a Joy Engineer
100 Years of Engineering Leadership

H.E. 351.3

JOY MANUFACTURING COMPANY
HENRY W. OLIVER BUILDING, PITTSBURGH 22, PENNSYLVANIA
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LTD., GALT, ONTARIO

Simple, Trouble-Free Aerial Service Unit—by EAGLE

LADDER EXTENDED

THIS combination ladder and all-purpose service body unit can be mounted on 1/2 and 3/4 and 1 ton trucks — a mobile, aerial service unit with a wide range of usefulness.

Extension ladder available in 24 ft., 28 ft., 32 ft. and 36 ft. lengths. Provides aerial equipment with no mechanical devices subject to breakdown or requiring maintenance attention. One-man operated — ladder easily extended or lowered and closed. Ladder is mounted clear of body floor. Service body offers safe, weatherproof storage compartments for tools and materials — available in 74 inch, 84 inch, and 94 inch lengths. Send for complete information on the Eagle Aerial Service Unit.

LADDER CLOSED

EAGLE

EAGLE MANUFACTURING CO.
Division of
The Four Wheel Drive Auto Co.
APPLETON, WISCONSIN

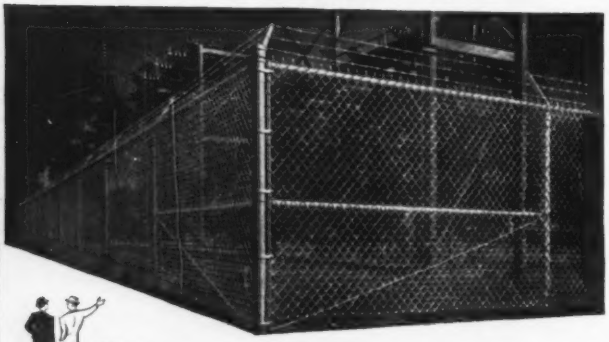
Utility Bodies • Trailers • Pole Derricks
Tools and Accessories
Eagle equipment is engineered by and for utility men expressly for their needs

Detailed by Gravely

Send today for the complete catalog of Eagle Line Construction and Maintenance Equipment — a useful reference book.

PAGE FENCE — Since 1883

• AMERICA'S FIRST WIRE FENCE •



Sabotage is a danger which calls for vigilance day and night. Property line vigilance is the job for Page Chain Link Fence, now as it has been for more than 60 years. Consult the nearby, long-experienced Page Fence engineering and erecting firm, which will submit cost estimates without obligation. Name and address will be sent with illustrated fence data on request.

Write *to* ***PAGE FENCE ASSOCIATION*** *in* ***Monessen, Pa.,*** *Atlanta, Bridgeport, Chicago, Denver, Detroit, Los Angeles, Philadelphia, New York or San Francisco.*

PRODUCT OF PAGE STEEL & WIRE DIVISION OF AMERICAN CHAIN & CABLE COMPANY, INC.

Calif., El Toro—Schurr Finlay, Inc., 6800 West Blvd., Los Angeles, Calif., LB $289,648, underground electrical distr. sys., Spec. 29077, at Marine Corps Air Station. Dpt. Navy, Eleventh Dist., San Diego, Calif. Bid Aug. 2.

Colorado—W. J. Thomas, Magnolia Bldg., Dallas, Tex., CA, $117,493 labor only for 511 mi. of rural distr. lines, La Junta, Otero Co. South East Colorado Power Assn., La Junta, Colo. Bids Aug. 2, awarded Aug. 16.

Ind., East Chicago—The Austin Co., 510 N. Dearborn St., Chicago 10, Ill., CA $450,000. FACTORY ADDN and power plant modification, EAST CHICAGO, IND. Metal & Thermit Corp., 149 151 St., Chicago, Ind. Awarded Aug. 21.

Ind., West Marion—Indiana and Michigan Electric, Marion, Ind., Owner builds. Approx. $200,000 SUB STATION.

Kansas—A. P. Reis, National Bank of Topeka Bldg., Topeka, Kan. CA $589,377. 526.4 mi. rural distr. lines, Jewell, Mitchell, Osborne, Russell, Lincoln, Cloud, Rooks and Smith Counties, Jewell-Mitchell Cooperative Electric Co., Mankato, Kan. Bids Aug. 15.

Missouri—L. P. & H. Constr. Co., Linton, Ind. LB $222,801. 145.35 mi. rural distr. lines, 5.31 mi. tie lines, etc., St. Clair, Cedar, Vernon, Hickory, Polk and Dade Counties. Sac-Osage Electric Co-operative, Eldorado Springs, Mo. Bids Aug. 14.

Mo., St. Louis—General Electric Co., River Rd., Schenectady, N. Y. LB $491,600. 3,500 kw unit, one gas turbine with accessories, received no bids for heat exchanger with accessories. City, Frank J. McDevitt, pres., Pub. Service, 304 City Hall, 12 and Market Sts., St. Louis 3, Mo. Bids Aug. 14.

Okla., McAlester—Murphy Boiler Co., Shawnee, Okla., CA. $914,734. est. 1,000,000. POWER PLANT at Oklahoma State Penetentiary. Bd. Affairs, Capitol, Oklahoma City 5, Okla., Benjam Engr. Co., American Natl. Bldg., Oklahoma City, Okla. engrs., Bids Aug. 14. Awarded Aug. 23.

South Dakota—Sorkness Constr. Co., N 23 St. and 7 Ave., Fargo, N. D., CA $127,564, 39.1 mi. transmission lines in Haakon and Jackson Counties. West Central Electric Co-operative, Mundro, S. D. Bids Aug. 9.

Washington—Utility Constr. Co., 3113 S. Pine St., Tacoma, Wash., CA, $111,359, Franklin Substation addns., Inv. 5956 Franklin Co. Bonneville Power Admin., 827 N. E. Oregon St., Portland, Ore. Bids Aug. 6, awarded Aug. 13.

Wash., Forks—Cooper-Bessemer, 570 Avenue S, Seattle, Wash., LB $41,378, 345-kw diesel-driven generator for hydroelectric proj. Clallam Co. Pub. Utilities Dist., Port Angeles, Wash. Bids Aug. 14.

INDUSTRIAL, COMMERCIAL & PUBLIC BUILDINGS

Proposed Construction

Fla., Gainesville—State Improvement Comn., Tallahassee, medical center and nurses home at University of Florida, $15,750,000.

Ky., Fort Campbell—U. S. Eng., 830 W. Broadway, Louisville, plans by J. Stephen Watkins, 145 E. High St., Lexington, 63 permanent type buildings. $34,688,000.

La., New Orleans—Freeport Sulphur Co., Freeport, sulphur mining plant at Garden Island Bay in marshes of lower Mississippi Delta, $15,000,000.

Pa., Danville—Merck Co., 126 E. Lincoln Ave., Rahway, N. J., Mfg. facilities $8,000,000.

Pa., Phila.—Max E. Cohen, Market St. National Bank Bldg., Phila., Pa., apartment bldg., Parkway and 24 St., $5,000,000.

B. C., Burnaby—Standard Oil Co. of British Columbia, 906 Marine Bldg., Vancouver, B. C. oil refinery expansion on 70-acre site present refinery $50,000,000.

Low Bidders & Contracts Awarded

Ala., Mobile—H. K. Ferguson Co., 1783 E. 11 St., Cleveland, Ohio, CA, $10,000,000, rayon weave PLANT. Courtaulds, Inc., c/o Lutre Fiber, 600 5th Ave., New York, N. Y., and St. Martins-le-Grand, London, England.

Wash., Everett—L. H. Hoffman Co., 715 S.W. Columbia Blvd., Portland, Ore., CA $20,000,000, rein.-con. buildings for pulp MILL. Weyerhaeuser Timber Co., Tacoma Bldg., Tacoma, Wash. G. F. Alcorn, c/o owner, engr.

Basal Bark Spray with

Thompson's

Bramble-Weedicide

There's no "off-season" for controlling brush and tree growth with Thompson's Tested Bramble-Weedicide. Matter of fact, many utility men find Fall and Winter basal bark spraying more economical, more satisfactory than Summer foliage spraying.

Whether you spray by plane, truck or basal bark, it pays to use Thompson's Bramble-Weedicide. You get full strength — 2 pounds of 2,4-D and 2,4,5-T esters to the gallon — more killing units for your dollar. It is low volatile for utmost efficiency and low polarity for better penetration.

UTILITY MGR. WRITES

"Basal Bark Spraying has been tried with most promising results. It seems to be effective on all species, costs less to apply and can be used at any time of year."—*W. E. Adams, Manager, Macon Electric Co-op. Macon, Mo.*

If your jobber can't supply you, or for technical information, write us direct.

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HORTICULTURAL

CHEMICALS CORP.

St. Louis 3, Missouri

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other *Thompson's* tested

WEED & BRUSH KILLERS

- **WEEDICIDES:** 2,4-D Esters and Amines
- **BRAMBLECIDE** 2,4,5-T Low Volatile Ester
- **PHYTOCIDE** General
- **PENTA-WEEDICIDE** Weed Killers

That's BUCKINGHAM on TOP

Buckingham has been up on top for more than 50 years—making safe, dependable, comfortable climbing equipment second to none. That's why you can buy with confidence if it's Buckingham.

New

ADJUSTABLE CLIMBER

Now—adjustable tops are optional on any type Buckingham Climber! Adjust from size 15 to 18½—gives every lineman an exact fit, far more comfortable than standard ½ inch sized climbers. Saves on inventory—one pair fits every man on crew . . . practical as extra climbers for service truck, plant, substation. Typical Buckingham quality and safety.

NYBUCK (NYLON) SAFETY STRAP

Here's added safety, from Nybuck—Buckingham's new nylon strap. It's impregnated with Neoprene—strength is not affected by pole dressings, cleaning agents or climate. This is the strongest safety strap, size-for-size, being made today!

Safety straps also available in fabric or heavy-duty harness leather.

"CUSHION DELUXE" FLOATING TOOL BELT

This is far and away the lineman's favorite. And no wonder! Its cushion-edge effect gives much greater working comfort. Its floating feature (straps do not bind—they *slide* easily) means that the tool loops stay full and open at all times. It's lightweight —only 3 lbs. 12 ozs. Linemen find they can work faster and more comfortably with *this* belt.

Write for Catalog No. 24 giving complete information on the full Buckingham line. It's FREE! Or see your nearest distributor.

BUCKINGHAM MANUFACTURING CO., INC.

1-3 TRAVIS AVE. BINGHAMTON, N. Y.

New "325" Attachment
. . . Derrick and Digger Unit
For 3/4 and 1-TON TRUCKS

Why send a five man truck and crew on pole replacement or service jobs that can now be handled by two men and a highly portable ¾ or one ton service truck? The "325" attachment makes it possible for two men to set up the derrick, attach the digger, dig the hole and set the pole ready for tamping *in less than ten minutes*! This set-up, with or without radio communication, speeds up line work and cuts costs way down.

Write for fully illustrated Bulletin 325.

★ No more using five-man crews on two-man jobs

★ Sets poles up to 35'; take augers 8" to 20" diameter

★ Packaged unit for installation by your local mechanic

TEL-E-LECT PRODUCTS, INC.

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LOOK... FOR THE YELLOW TRIANGLE-

a symbol of Wickwire Quality when you're buying wire rope. It's your assurance of utmost stamina and uniformly dependable performance... longer, more economical service on the job.

Write for free copy of "Know Your Ropes" —82 pages of helpful information on selection, application and correct usage of wire rope. Address your request to: Wire Rope Sales Office, Palmer, Mass.

The Colorado Fuel & Iron Corporation, Denver, Colorado
The California Wire Cloth Corporation, Oakland, California
Wickwire Spencer Steel Division, Palmer, Massachusetts

WICKWIRE ROPE
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION CF&I

BRANCHES IN ALL KEY CITIES

A COMPLETELY INSULATED
SPLICE
IN 3 SIMPLE STEPS

A PERFECT WIRE
TERMINATION
IN 1 EASY OPERATION

ALL installed with **1** "pres-SURE-tool"

ONLY 2 Splice Caps for 2 # 18 to 3 # 8 wires

ONLY 1 'Termend' for 1 # 16 to 1 # 8 wire

BUCHANAN
Electrical Products Corporation

Write for catalog 1050A

TECHNICAL LITERATURE

Lighting — *A Lighting Guide to Better Drafting* demonstrates proper lighting for straight-edges and shiny surfaces, proper positioning of drafting boards, and recommended types of lighting systems for better drafting. Also given are helpful hints on the right illumination for tracing tasks, for reference and index systems, and for clerical work. Available without cost from the Inquiry Bureau, General Electric Co, Nela Park, Cleveland 12, Ohio.

World Power—*The Statistical Year-Book of the World Power Conference* brings the inventories of the resources and production, stocks, imports, exports, and consumption of power and power source in 60 countries forward to 1947. Published by the World Power Conference, London, and distributed in this country by the American Society of Mechanical Engineers, 33 West 39th St, New York 18, N. Y. Cost is $6.00.

Air Circuit Breakers—Practical information concerning testing, rating, manufacture application, and performance of low voltage breakers having interrupting ratings of 10,000 amp and above is contained in *Standards for Large Air Circuit Breakers*, Publication SG3-1951. Copies may be ordered for $3.25 from National Electrical Manufacturers Association, 155 East 44 St, New York 17, N. Y.

Subway Type Transformers — *Standards for Distribution Transformers* NEMA publication 113-1951 contains design standards for certain mechanical and electrical features of conventional subway-type distribution transformers with high voltage 2400-15,000 volts, low voltage 600 volts and below. May be obtained for 60¢ from National Electrical Manufacturers Association, 155 East 44 St, New York 17, N. Y.

Silicone Insulation—A new series of product bulletins covering heat resistant Class H silicone electrical insulation have just been published. Copies may be obtained from Insulation Manufacturers Corp, 565 West Washington Blvd, Chicago 6, Ill.

Standards List—Ninety-nine new and revised American Standards containing more than 1180 specifications, methods of test, etc, are listed in the latest edition of the *Price List of American Standards*. The 26-page list may be obtained from the American Standards Association, 70 East 45 St, New York 17, N. Y., without charge.

Transportation — *Proposed Standard for Electrical Control Apparatus for Land Transportation* has been issued for trial use as a proposed revision of AIEE standard 16-1933. Publication 16A may be ordered from the American Institute of Electrical Engineers, 33 West 39 St, New York 18, N. Y.

Grounding—*Application Guide for Grounding of Instrument Transformer Secondary Circuits and Cases* contains general and specific recommendations for grounding in all types of installations. It may be obtained from American Institute of Electrical Engineers, 33 West 39 St, New York 18, N. Y.

Technical Reports—The May 1951 issue of the *Bibliography of Technical Reports* has a special feature covering accomplishments in the research fields of polymer science and engineering. In all 233 reports are listed from federal, foreign, and other nonconfidential sources; most of them not previously publicized. Copies may be purchased from the U. S. Department of Commerce, Washington 25, D. C. Order should be accompanied by check or money order for 50¢ payable to the Treasurer of the United States.

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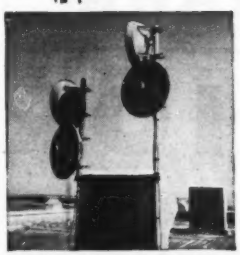
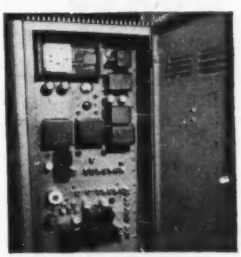


Two links of receiving and transmitting antennas of Central Arizona Light & Power Co., located on roof of generating plant.



RCA Microwave Transmitter-Receiver. The generating plant and each switching station has a transmitter-receiver.

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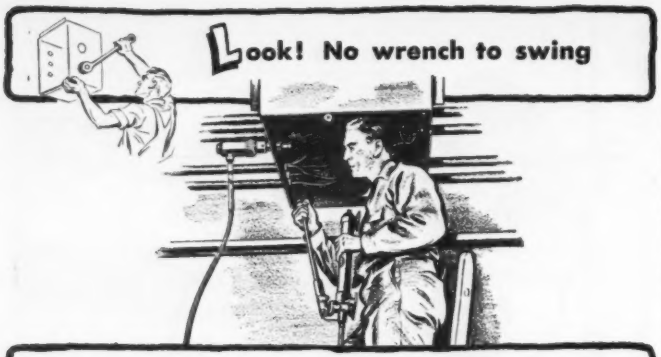
ENGINEERING PRODUCTS DEPARTMENT, CAMDEN, N.J.

In Canada: RCA VICTOR Company Limited, Montreal



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BOOK REVIEWS

Gas Discharge Lamps

Gas Discharge Lamps **By J. Funke and P. J. Oranje. Published by N. V. Philips' Gloeilampen fabrieken, Eindhoven, Netherlands. 288 pages, illustrated.**

This is another in the Philips Series of Books on Light and Lighting which presents a survey of existing types of discharge lamps together with relative possibilities, advantages and disadvantages, characteristics and principles. It is phrased in terms that can be understood by the nontechnically trained and it touches upon technical points in simple terms. Those lamps which are used for general lighting purposes in the broadest sense are fully reviewed, whereas lamps for illuminated advertising and those for which the field of application is strictly limited are only briefly described.

Nucleonics

The Chemistry of Uranium Part I. **By J. J. Katz and E. Ratmowitch. Published by McGraw-Hill Book Co, New York 18. 609 pages, illustrated. Priced $7.25.**

An installment (Div. VIII—Vol 5) in the National Nuclear Energy Series this deals with the element uranium, its binary and related compounds. A subsequent portion will deal with the properties of uranium ions and their reactions in solutions. Here there is discussion in detail of the isotopes, the packing friction, spectral behavior, mineral sources and extraction methods before discussing the properties including thermal of uranium metal. The latter half then records the chemistry of uranium, such as its mutual solubility with other metals, the halides, etc. In brief the book constitutes a source of information for the power engineer when, as and if he finds uranium available to him for derivation of energy from a reactor employing uranium in some practicable form.

Civic Protection

Civil Defense in Modern War. **By A. M. Prentiss. Published by McGraw-Hill Book Co., New York 18. 429 pages, illustrated. Price $6.00.**

Organization for civil defense can only be affected if it recognizes the potentialities of atomic, bacterial and chemical assault upon the population from the air. This book reassesses the possibilities of massacre in these three "A B C" approaches and thereafter portrays the air defenses which can ward them off to some extent. This sets the pattern for ground organization to provide shelters, evacuation, rescue and treatment right down to the level of the warden and his local crew. This is a new guide for utility setups in so far as they coordinate with the governmental groups.

Nucleonics

Fundamentals of Atomic Physics. **By Saul Dushman. Published by McGraw-Hill Book Co, Inc, New York 18. 294 pages, illustrated. Price $5.50.**

Engineers who like the historic approach to the mosaic which represents the physics of today will welcome this book by the well-known General Electric scientist. In language that any technical man should be able to understand and using mathematics in simplest feasible form there is built up step by step the chink-filling bricks which form the structure of atomic physics. How the phenomena were discerned and the quantitative evaluations derived is portrayed in a well-connected reconstruction of the evolution of modern physics. Not only is it thus a historical review but at the same time a good reference for the great names of physics, the laws which they enunciated, and the constants they derived.

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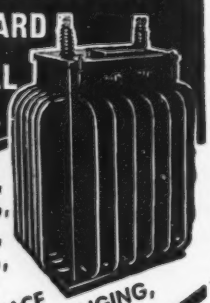

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MOTION PICTURES

Films listed below are for 16 mm sound projectors and cannot be shown on silent equipment. Except as noted there is no charge for use but the borrower is usually expected to pay transportation charges one or both ways and insurance against loss or damage to films.

Danger Sleuths (20 minutes)—This film portrays the part that the work of Underwriters' Inc. plays in safeguarding the average American family throughout its daily life. After illustrating the possible fire, accident, and crime hazards that confront all of us at home, school, and work, it then takes the audience "back stage" to see just how the Laboratories' work insures safety.

An Honorable Mention Award has been voted this film in the recent safety contest by the National Committee on Films for Safety.

Underwriters' Laboratories, Inc, 207 East Ohio St, Chicago 11, Ill.

Building for the Nations (35 Minutes)—A candid factual record, in color, of the highlights of the fabrication and erection of the structural steel work for the Secretariat Building of the United Nations Headquarters in New York City.

Scenes include preparation of the site and building foundations—manufacture and fabrication of the structural members—erection of column section and beams—riveting and dedication.

Sequence on operation of guy—derricks contains animated scenes showing derricks lifting themselves to the next operating level.

United States Steel Corporation Subsidiaries, Pittsburgh 30, Pa.

Hi-I . . . Today & Tomorrow (15 minutes)—Filmed in color this picture tells the story of Hi-I A. V. C. (National Electric Code Type AVA) Cable. Cable installations are shown in new construction and replacing wiring in industrial buildings. Rockbestos Products Corp, New Haven 4, Conn.

Commutation of DC Machines (24 minutes)—Theory and maintenance of commutation of dc motors and generators is presented in this film.

Animated drawings explain the theory of commutation. A concise explanation follows, showing the troubles that arise from stray oil and grease, moisture, looseness of mounting, worn brushholder boxes, grooving, poor seating of new brushes, and irregular inspection.

Mending these difficulties is demonstrated in detail.

Westinghouse Electric Corp, 511 Wood St, P. O. Box 868, Pittsburgh 30, Pa.

Arc Welding Aluminum (10 minutes)—Metal arc, carbon arc and atomic hydrogen processes for welding aluminum are discussed in this film. Each sequence shows the uses and advantages of this type of weld. Proper equipment and protection of personnel are illustrated. A discussion of preheating, angle of rod to work, and step by step operation serve to help the operator improve his welding techniques.

Aluminum Company of America, 818 Guld Building, Pittsburgh 19, Pa.

Neoprene The Versatile Chemical Rubber (22 minutes)—A color motion picture designed primarily for sales and industrial groups. Film describes the manufacture of neoprene and shows how it can be used in a wide variety of applications for which natural rubber is unsatisfactory. Laboratory demonstrations point out the superiority of neoprene over natural rubber in resistance to sunlight, oxygen aging and ozone, heat, oil, flame and in retention of gases.

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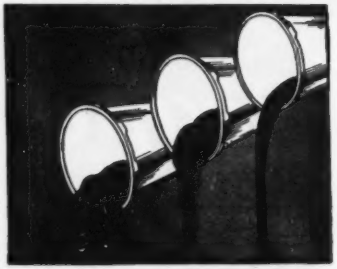

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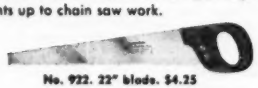

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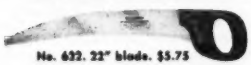

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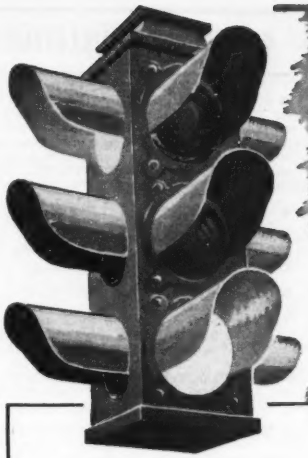

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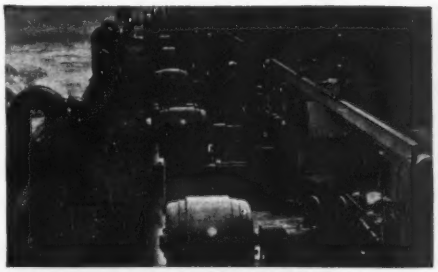

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● CONDENSER TUBES: "Life Extension for Condenser Tubes" reports on long research done on the phases of corrosion and the means of combatting them, as well as on the choice of condenser materials. Revere Copper and Brass Inc, 230 Park Ave, New York 17, N. Y.

● VARNISHED INSULATION: A revised edition of "Varnished Insulation and Insulating Varnishes" has been issued by Irvington Varnish and Insulator Co, 6 Argyle Terrace, Irvington 11, N. J.

● PULP MILL DRIVES: Listed as publication GEA-5520, a new 8-page bulletin on electric drives for pulp mills describes drives for barkers, saws, chippers, pumps, and allied equipment. Theme of the publication is "Reliable Equipment and Service Help Keep Your Mill at Peak Production." General Electric Co, Schenectady 5, N. Y.

● ELECTRICAL TAPE: More than 30 uses for four "scotch" brand electrical tapes are described in new 8-page brochure. It contains 33 photographs of applications. Properties listed for each tape include color, thickness, tensile strength, insulation resistance, power factor, and electrolytic corrosion factor. Minnesota Mining and Manufacturing Co, St. Paul, Minn.

● POTENTIOMETERS: Electrical and mechanical properties, physical dimensions, power ratings, and similar engineering data are included in a quick reference technical data chart on various Helipot potentiometers. Helipot Corp, 912 Meridian St, So. Pasadena, Calif.

● BATTERY CONSERVATION: To assist battery users in obtaining increased battery performance, the "Plus-Performance Plan" has been prepared. This plan consists of an integrated conservation program based on applicable charts, manuals, and articles pertaining to particular users' problems. Gould-National Batteries Inc, Trenton 7, N. J.

● THREAD INSERTS: A 16-page bulletin covering design data on helical-wire thread inserts and the use of these inserts in protection and repair of tapped holes is now available. Detail drawings and text explain how inserts are used as original manufacturing components and in production salvage operations. Heli-Coil Corp, 47-23 35 St, Long Island City, N. Y.

● CONSULTANTS' DIRECTORY: A 136-page directory, "Consulting Services," listing chemical engineering consultants may be procured from Association of Consulting Chemists and Chemical Engineers, Inc, 50 East 41 Street, New York 17, N. Y.

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Advertising In This Issue

Accurate Mfg. Co. 59
Aerotec Corp., The 194
Air Preheater Corp., The 50
Allis-Chalmers Mfg. Co. 20, 39, 58, 85, 146, 147
American Blower Corp. 88, 89
American Steel & Wire Co. ...14, 15
American Structural Products Co. 233
Anaconda Wire & Cable Co. 84
Anderson Brass Works, Inc. ... 168
Ansonia Electrical Co., Sub. of Noma Electric Corp. 195
Auth Electric Co., Inc. 148

Bakelite Co., Div. Union Carbide & Carbon Corp. 175
Bartlett Mfg. Co. 226
Bell Telephone Laboratories 40
Bentley, Harris Mfg. Co. 66
Bethlehem Steel Co. 198
Biddle Co., James G. 16
Blackburn Corp., Jasper 57
Blackhawk Mfg. Co. 238
Brewer-Titchener Corp. 54
Bristol Co. 90, 91
Brown Boveri Corp. 227
Buchanan Electrical Products Corp. 236
Buckingham Mfg. Co., Inc. 235
Burndy Engineering Co., Inc. ... 19
Burroughs Adding Machine Co. .. 24

Cardox Corp., The 22
Carnegie-Illinois Steel Corp. 93
Chance Co., A. B. 182
Chapman Chemical Co. 35
Chase Brass & Copper Co., Inc., 179
Chase-Shawmut Co., The 173
Chicago Pneumatic Tool Co. .210, 211
Coal Chemical Sales Div., U. S. Steel Corp. 208
Cochrane Corp. 43
Coffing Hoist Co. 164
Colorado Fuel & Iron Co., Wickwire Spencer Steel Div. 236
Combustion Engineering-Superheater Inc. 10, 11
Commonwealth Associates, Inc. .. 220
Commonwealth Services, Inc. 220
Consolidated Treating Co. 189
Continental-Diamond Fibre Co. .. 169
Control Corp. 218
Copperweld Steel Co. 69
Cornell-Dubilier Electric Corp. .96, 97
C-O-Two Fire Equipment Co. ... 188
Crescent Insulated Wire & Cable Co. 153
Crescent Tool Co. 61
Crouse-Hinds Co. 162, 163

De Laval Separator Co., The 203
Directory of Engineers 244
Dixon Crucible Co., Joseph 240
Dodge Div. of Chrysler Corp. ... 219
Dow Chemical Co. 172
Driver-Harris Co. 55
du Pont de Nemours & Co., (Inc.) E. I., Rubber Chemicals Dpt. .. 200

Eagle Mfg. Co. 234
Ebasco Services, Inc. 209
Eisler Engineering Co., Inc. 240
Electric Products Co., The 226
Electric Service Mfg. Co. 30
Electrical Engineers Equipment Co. 44
Electrical Facilities, Inc. 242
Electrical World 94, 95
Electroline Company 5
Elliott Co. 154, 155
Engineers, Directory of 244

Ferranti Electric, Inc. 232
Foster Wheeler Corp. 74, 75

G & W Electric Specialty Co. 62
Gai-Tronics Corp 67
General Electric Co.,
Apparatus Dept. 12, 13, 48, 133 134, 135, 137, 139, 141, 143
Electronics Dept. 190, 191
Gould-National Batteries, Inc. ... 21
Graybar Electric Co. 32, 33
Green Fuel Economizer Co. 241
Grinnell Co., Inc. 224
Guth Co., The Edwin F. 161

Hazard Insulated Wire Works ..4, 242
Highway Trailer Co. 231
Holan Corp., The J. H. 42
Holophane Company, Inc. 229
Honan-Crane Corp. 201
Hotpoint, Inc. 52
Hubbard & Co. 171

Illinois Electric Porcelain Co. 178
Indiana Steel & Wire Co. 239
Irvington Varnish & Insulator Co. 63
I-T-E Circuit Breaker Co. 76, 77

Jenkins Bros. 237
Johns-Manville 206, 207, 231
Joy Mfg. Co. 233

KPF Electric Co. 156
Kaiser Aluminum & Chemical Sales, Inc. 202
Kellogg Co., The M. W. 193
Kerite Co., The 100
Kidde & Co., Inc., Walter 56
Kuhlman Electric Co. ...Fourth Cover
Kuljian Corp., The 34

Lapp Insulator Co., Inc. 216
Line Material Co. 25, 26, 27, 28, 29
Locke, Inc. 68

Macallen Co. 64
Mall Tool Co. 37
Mallory & Co., Inc., P. R. 204
Marcus Transformer Co. 184
McCabe Powers Auto Body Co. .. 38
McGraw-Hill Book Co., Inc. 245
Minerallac Electric Co. 240
Moloney Electric Co. 47
Monsanto Chemical Co. 8
Murray Mfg. Co., D. J. 232

National Telephone Supply Co ..... Third Cover
National Varnished Products Corp. 60
Neils Lumber Co., J 192
Newport News Shipbuilding & Dry Dock Co. 221
Nickel Cadmium Battery Corp. .. 242

Ohio Brass Co. 149, 150, 151, 152
Okonite Co., The 4, 242
Orangeburg Mfg. Co., Inc. 80
Owens-Corning Fiberglas Corp. Electrical Sales Div. 53
O. Z. Electrical Mfg. Co., Inc. 213

Page Fence Ass'n. 234
Palnut Co., The 230
Pennsylvania Transformer Co. 65
Philadelphia Gear Works, Inc. 165
Pioneer Service & Engineering Co. 73
Porcelain Insulator Corp. 174
Porcelain Products, Inc. 46
Preformed Line Products Co. .166, 167
Pyle-National Co., The 45

Radio Corp. of America, Engineering Products Dept. 237
Railway & Industrial Engineering Co. 17
Revere Copper & Brass, Inc. 145
Reynolds Metals Co. 205
Roebling's Sons Co., John A. 51
Rome Cable Corp. 176, 177
Russell & Stoll Co. 225

S & C Electric Co. 6, 7
Sangamo Electric Co. 78, 79
Searchlight Section 245, 246, 247
Simplex Wire & Cable Co. 185
Smith & Son Inc., Seymour 241
Sorg Printing Co. 239
Southern States Equipment Corp. 72
Square D Co. 23
Standard Transformer Co. ...196, 197
Star Porcelain Co. 242
Subox, Inc. 240
Superior Switchboard & Devices Co. 238
Sylvania Electric Products Inc. 180, 181

Tel-E-Lect Products, Inc. 236
Texas Co., The .....Second Cover
Thomas & Sons Co., R. 18
Thompson Horticultural Chemicals Co. 235
Trumbull Electric Dept. of General Electric Co. 31

Union Carbide & Carbon Corp. Bakelite Div. 175
Unistrut Products Co. 183
United States Rubber Co. 223
United States Steel Corp. 14, 15, 93, 208
Utica Drop Forge & Tool Corp. 230

Van Cleef Bros., Inc. 49
Victor Insulators, Inc. 157

Wagner Electric Corp. 36
Weaver Co., J. A. 81
Westinghouse Electric Corp. ...9, 70, 71, 82, 83, 86, 87, 98, 99, 186, 187, 199
Westinghouse Electric Corp., Lamp Dept. 214, 215
Westinghouse Electric Corp., Sturtevant Div. 41
Weston Electrical Instrument Corp. 92
Whitaker Reel Mfg. Co. 240
Wickwire Spencer Steel Div., Colorado Fuel & Iron Co. 236
Worthington Pump & Machinery Corp., Engine Div. 212

York-Hoover Corp. 222

■

PROFESSIONAL SERVICES 244

■

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT
Positions Vacant 245, 246
Selling Opportunities Offered 246
Positions Wanted 245
Employment Agencies 246
Employment Services 245
EDUCATIONAL
Books 246
EQUIPMENT
(Used or Surplus New)
For Sale 247
WANTED
Equipment 246

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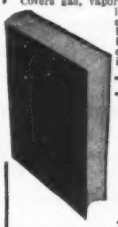

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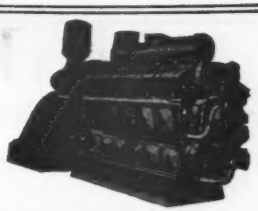

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1250	General Motors	16-278A	1600	720	312	General Motors	8-268A	450	1200
937.5	General Motors	12-567	1050	720	312	Clark	MD-4	375	327
625	Alco	6-12½x13T	750	600	125	Ingersoll Rand	S	225	514
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1	1500	G.E.	360	275	2200/4400
1	1000	Whse.	900	600	4150
1	1000	G.E.	900	280	4100/6900
1	750	Whse.	900	275	2300/4150
2	500	Whse.	900	250	6600/13200
1	500	Whse.	1200	125/250	2300
1	500	G.E.	900	600	2300/4000
1	500	Whse.	900	250	440
1	500	G.E.	720	125	2300
1	400	G.E.	720	250	440/2300
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4	2500	Mal.	O15V	1	69000x13800
3	1250	G.E.	HVDDJ	1	6600x550
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1— 200 KVA G.E., 3 Ph., 2400V 220 Sec.
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LETTERS TO THE EDITOR

In Brazil, Same as Here

To the Editor:

In Electrical World for November 6, 1950, you published a condensation of my paper, "Cost of Electric Power in Industry."

I recently received a letter from Mr. V. Burian, Chief Engineer Cia Central Brazileira De Forca Electrica, Vitoria, Estado De Espirito Santo, Brazil, enclosing a copy of their local Rotary Magazine, in which was published a paper presented by Mr. Burian to the Rotary Club of Vitoria. In this paper Mr. Burian had quoted extensively from the above article and then adapted the method to an analysis of the costs of electric energy for manufacturing in industry in his own state of Espirito Santo.

Mr. Burian must have done a great deal of research, as his article deals with many industries and is replete with charts and tables. The average distribution of manufacturing costs derived by him for Espirito Santo (1948 data) is:

Raw materials—64.3%
Salaries and related Costs—7.6%
Taxes—6.3%
Electricity—1.8%

Although the average of 1.8% for electricity cost in industry in this Brazilian state is about three times the 0.59% average for the United States as given in my article, it still sustains strongly our thesis that price of electricity is not an important factor in the location of manufacturing plants. I believe this is true all over the world.

J. A. Whitlow
3863 South Utica
Tulsa, Oklahoma

220-Kv Cables in France

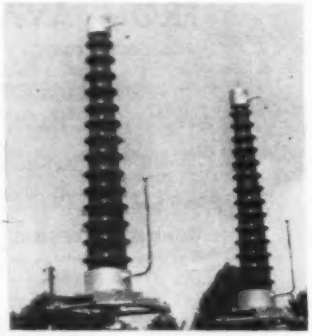
To the Editor:

We read with considerable interest the information and photographs on pages 16 and 17 of the May 28 Issue of "Electrical World", dealing with installation of the 220-kv cables and terminals now being tested in the area of the Electricite de France Station at Fontenay.

In agreement with the British Insulated Callender's Cables Ltd, we would deeply appreciate your publishing the following information:

The sealing ends of two phases of the gas filled cable were developed by B.I.C.C., and the porcelains were made by Taylor-Tunnicliff of England; the sealing ends of the third phase were supplied by "Les Trefileries et Laminoirs du Havre" and the porcelains were supplied by "La Compagnie Generale d'Electroceramique."

As far as we know, they are the only 220-kv insulators able to withstand an internal pressure of 200 psi and **fired in one piece.** They are roughly 9½ ft high and 16 in. large at their base. The breakdown pressure is about 800 psi. The design of the inside is of the condenser cone type.



TERMINALS for French 220-kv cable

J. Desbordes
Trefileries et Laminoirs du Havre
Saint-Maurise, France.

Editor's Note: Thanks to reader Desbordes for setting the record straight. Electrical World reported that terminals for the gas-filled cable were made by Taylor-Tunnicliff.

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Microwave vs Carrier

To the Editor:

The article by Mr. Krings, "Microwave vs Carrier," (July 16th issue) is certainly a well-thought out analysis of the subject at hand.

If you can spare as many as fifty copies in reprint, they would be most appreciated by the members of our Microwave Sales and Engineering Divisions.

Owen H. Klepper
Advertising & Promotion Mgr
Philco Corporation
Philadelphia, Pa.

Editor's Note:—A limited number of reprints are available at 20 cents each.

Error in Table

To the Editor:

I have just read the Street Lighting story in the August 13 issue. You may be interested in a minor typographical error in the first item of Table V—the $522,360 of "Full Cost for Electricity" should have been $552,360.

H. F. G. Main
Purcellville, Virginia

Hardly a French TVA

To the Editor:

In the August 6th issue of Electrical World on page 11 there is a statement relative to the new units in the Donzere-Mondragon hydroelectric development on the Rhone which states that this is France's equivalent of the TVA.

I would like to call your attention to the fact that this Rhone development is a semi-private development—about one-half of the capital being supplied from private sources and the rest by the French government. All of this power will be sold to the government-owned electric power system. Differing entirely from TVA, the project must carry its own investment costs, and the French government requires the payment of taxes.

C. W. Mayott
Assistant to the President
The Hartford Electric Light Co
Hartford 15, Conn.

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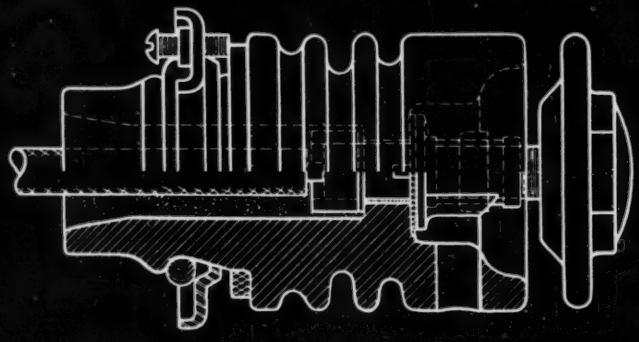

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